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WHITON LATHE AND DRILL CHUCKS.

HILL, CLARKE & CO.,

AGENTS,

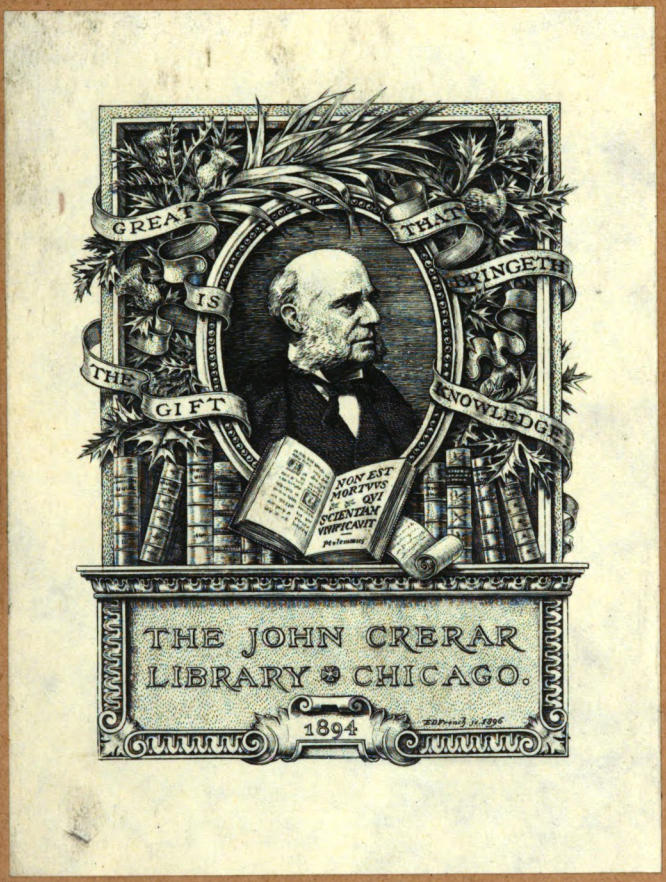
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Illustrated

Catalogue and Price List

of

LATHE AND DRILL CHUCKS

and

Special Chucks for All Purposes

Manufactured by

The D. E. Whiton Machine Co.

New London, Conn.

U. S. A.

Separate Catalogues of WHITON CENTERING MACHINES and WHITON GEAR CUTTING MACHINES will be sent upon application.

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Introductory.

A WIDE variety of Chucks and a large stock is now more necessary than ever before, in order to meet the demands of the trade promptly. These varieties may be grouped in three general classes, in accordance with their adaptation to Light, Medium, or Heavy work, and in presenting this revision of our Chuck Catalogue we have classified our products accordingly.

As a result of our experience in designing special machinery, we have also noted the importance of presenting the leading dimensions of these Chucks, as an aid in specifying and buying the styles best adapted to particular needs.

To place the combined advantages of our large assortment and stock, and this important information regarding sizes, at the immediate disposal of the purchaser, we have added a comprehensive Telegraphic Code.

Throughout a business history of forty years it has been our constant aim to furnish only tools of uniform excellence. This will still be our policy, and we respectfully solicit a continuance of the patronage with which we have been favored.

The D. E. Whiton Machine Co.

New London, Conn., U. S. A.
January, 1896.

Our New Goods.

For Light Work

We have added a number of sizes to our lines of "Champion" Scroll and "Champion" Independent Jaw Chucks, and a complete new list of light weight "Champion" Geared Scroll Chucks. These several styles are not only well adapted to the needs of amateurs, but are also particularly suited to that large class of light manufacturing in which the smaller Lathes are now so extensively used. All are made in the best manner, and are accurate and durable Chucks of very attractive design.

For Regular Work

Numerous sizes have been added in a number of the styles heretofore offered by us; and we have made large additions to our lines by including Reversible Jaw Geared Scroll Chucks, Geared Scroll Combination Chucks, Face Plate Jaws, Geared Screw Combination Chucks, Universal Geared Screw Chucks, and Two Jaw Chucks with round and box bodies: all with original and special improvements lately patented by us, or upon which patents are now pending. We are also prepared to furnish the numerous specials which may be properly included in this class.

For Heavy Work

We have established an entirely new class of Chucks, not to be compared with anything heretofore offered. The rapidly extending use of powerful Turret and special Lathes, in which a number of heavy cuts are taken at the same time, has necessitated the design of equally special Chucks of ample weight and holding power. For these advanced requirements we are now offering new lists, both Universal and Independent, and are prepared to submit estimates upon, and to promptly furnish complete chucking facilities adapted to any special Lathes, for large lines of the heaviest work, from

samples or drawings of the pieces to be chucked. Designers and manufacturers of such special machines are particularly invited to notice the greatly improved facilities for holding heavy work which we now offer.

For Special Work

In any of these classes we have the very best skill and facilities in our Designing, Draughting, and Pattern Making Departments, as well as in the various departments of manufacture, and our experience in the use of the most improved special machinery enables us to judge intelligently of the requirements in any given case. We illustrate a number of such specials, and solicit correspondence regarding work of this class.

For Holding Drills,

We offer three sizes of a new self-tightening Chuck with which we have obtained very satisfactory results in our own use, in addition to the styles which we have heretofore manufactured. We also illustrate some specially mounted Chucks to be used on Drill Press Tables, for which we have had a considerable demand.

Our Catalogue and Stock.

Interested persons will find it of advantage to notice the contents of this catalogue carefully, as we have endeavored to give very complete information, and to answer many of the questions which are frequently made the subject of correspondence.

A sufficient working capital allows us to carry a very large and well assorted stock of the standard varieties of Chucks herein illustrated, from which we are usually able to fill orders for any kind, size, or quantity, with special promptness. Our tools are also kept in stock by dealers in the leading cities of the world, any of whom will quote prices and fill orders promptly. In buying or inquiring of the trade, your interests will be best served by clearly specifying Whiton Chucks.

Orders and Shipments.

IN ordering, please use the names, designating numbers, or code words given, and specify the preferred shipping route.

We have found that a frequent source of misunderstanding is with regard to Styles of Jaws in small Chucks, and on this account we especially request complete instructions with all orders, and the use of the Style Numbers given on pages 13 and 14.

When **no specific instructions** are received, we shall supply No. 1 Jaws only, in Chucks which are listed with several styles.

Independent Jaw Chucks will be furnished with **Four Jaws,** unless Chucks with Three Jaws are specially ordered.

Universal Chucks, whether the Jaws are actuated by a scroll or by screws, and all **Combination Chucks,** will be furnished with **Three Jaws,** unless Chucks with Four Jaws are specially ordered.

We shall not feel responsible for any expenses or delays which may arise as a consequence of our adherence to these rules.

After final inspection, our Chucks are carefully coated with the best rust preventive, and each Chuck is separately packed in a suitable wooden box, complete with its wrench, bolts, and extra Jaws, if any, and placed in our stock rooms. Please bear in mind that any change, however slight, from our regular standard, involves extra handling and expense. We are glad to accommodate our patrons by making changes when desired, but in general it is better to write us regarding such changes before ordering.

For shipment, suitable packages or strong wooden cases of convenient size are used, and our tools always reach their destination in good order.

All our goods are delivered to Express, Railroad, or Steamship Companies at New London without charge for boxing or cartage. Small articles may be sent by open or registered mail as directed, at the risk of the purchaser, it being understood that we will use proper care in packing and addressing such articles.

Goods may be shipped from New London via

Adams Express,	N. Y., N. H. & H. R. R.,
American Express,	Central Vermont R. R.,
United States Express.	New England R. R.

Norwich Line Steamers,
Central Vermont Line Steamers, } To New York.

Terms.

ON open account all bills are due and payable in 30 days from their date, except by special agreement otherwise. A satisfactory credit rating in Dun's or Bradstreet's is a suitable and sufficient introduction upon which to order goods on account; but to parties not so rated, and with whom we have no acquaintance, our terms are invariably cash (or satisfactory reference) with order. Delay will be avoided by remitting with the order, and in the case of no preliminary correspondence, customers are assured that all amounts sent will be immediately acknowledged, and any payments over our best current discounts will be at once refunded.

We prefer not to send goods C. O. D. unless distinctly ordered to be so sent, as the charge for returning the money must in all cases be paid by the purchaser, and increases the net cost of the goods. It will be our general rule instead, to incur the delay of quoting price and requesting remittance before shipment, should any misunderstanding of our terms, as above stated, occur.

Guarantee.

OUR Chucks of all the various styles are fully warranted. In connection with this guarantee, please notice what is said about accuracy on page 17.

If any part should break after only a little use, because of a flaw or imperfection in fitting, a duplicate will be furnished free, provided the broken part be returned to us as a sample.

If a Chuck does not run true when first used, after having been carefully mounted on a true spindle, in accordance with the suggestions on pages 19, 20, it will be made true without charge, or replaced, if returned to us, provided our tests show the fault to be in the Chuck.

We **cannot be responsible** for any untruth which may appear, whenever the **original Face Plate Recess or reamed hole for taper mandrel** has been enlarged or changed in any way.

It is our intention to send out only perfect work, but mistakes and oversights will sometimes occur in spite of the most thorough system of inspection. Should there be any cause for complaint, please notify us at once, as it is of as much importance to us to have our Chucks prove true and satisfactory, as it can be to the user. In any such case, time will usually be saved by writing to us directly, as the dealer of whom the tool may have been purchased will simply refer any such matter to the factory for adjustment.

Telegraphic Code.

(Telegraph Address—"WHITON, NEW LONDON.")

BELIEVING that conciseness and simplicity are better served by a system of compounding syllables than by the more extended use of separate words, we have carefully compiled such a code, which we think is well suited to practical use.

All Price Lists in this catalogue include a short code word for each regular size and style Chuck. In ordering, the use of the code word only will always mean that only one article is required. To indicate a greater number of articles the proper final syllable may be affixed to any code word, in accordance with the following

Table of Endings.

Number.	Ending.	Number.	Ending.	Number.	Ending.
2	ing	**8**	est	**21**	acy
3	ed	**9**	ous	**24**	ary
4	age	**10**	eth	**30**	ide
5	er	**11**	less	**36**	ism
6	able	**12**	ate	**42**	ence
7	ent	**15**	ive	**48**	ize
		18	ish		

Examples.
(See Price List, Page 25.)

"Act" = 1 only 2″ Champion Lever Scroll Chuck, for Mandrel, No. 1 Jaws.
"Acting" = 2 only ditto.
"Asker" = 5 only 4″ ditto, for Face Plate, No. 2 Jaws.
"Acceptable" = 6 only 2″ ditto, for Face Plate, 2 sets of Jaws.

To Order Sets of Jaws only (without Chucks).

IL; IM; IN; IR. When **Sets of Jaws only** for any chuck or chucks are required, this may be indicated by prefixing either of the foregoing syllables to the code word indicating the chuck and style of jaws wanted. More than one set of jaws will be indicated by adding the proper ending as above explained.

Examples.
(See Price List, Page 25.)

"Inact" = 1 set of No. 1 Jaws only for "Act."
"Inacting" = 2 sets of No. 1 Jaws only for "Act."
"Inasker" = 5 sets of No. 2 Jaws only for "Ask."
"Inacceptable" = 6 sets each of No. 1 and No. 2 Jaws only for "Accept."

To Order Chucks with No. 3 or No. 4 Jaws only.

(See "Styles of Jaws," page 14.)

QUID, As a separate word, following any code word (which may always have any required prefix or ending), will indicate that **No. 3 Style Jaws, only,** in place of the jaws specified by the code word, are required.

QUILL, As a separate word, following any code word (which may always have any required prefix or ending), will indicate that **No. 4 Style Jaws, only,** in place of the jaws specified by the code word, are required.

Examples.
(See Price List, Page 38.)

"Gasing, Quid" = 2 3″ 1884 Patent Chucks, each with 3 No. 3 style Jaws only.
"Ingem, Quill" = 1 set of 3 No. 4 style Jaws only, for 6″ 1884 Patent Chuck.

To Order Chucks with Extra Sets of No. 3 or No. 4 Jaws.

QUIRK, As a separate word, following any code word (which may always have any required prefix or ending), will indicate that **No. 3 Style Jaws, in addition** to the jaws specified by the code word, are required.

QUIZ, As a separate word, following any code word (which may always have any required prefix or ending), will indicate that **No. 4 Style Jaws, in addition** to the jaws specified by the code word, are required.

Examples.
(See Price List, Page 38.)

"Geared, Quirk" = 3 only 4″ 1884 Patent Chucks, each with 4 No. 1 style Jaws and 4 No. 3 style Jaws.
"Grass, Quiz" = 1 only 7½″ 1884 Patent Chuck, with 2 sets of 3 Jaws and 1 set of 3 No. 4 style Jaws.

We include the following phrases which will facilitate telegraphic correspondence:—*

Requests.

Quote us by letter best price and time of delivery on .."Oak."

Wire us best price and time of delivery on"Oar."

Wire us best price on..... "Oat."

Wire us how soon you can ship....."Oil."

Send what you can of our order at once, and let balance follow soon as possible"Orb."

Hold goods on our order until you can forward all in one shipment"Out."

Please start tracer immediately for shipment of....."Owl."

Orders.

Enter our order and hold for shipping directions..."Oblige."

Send immediately by freight....."Observe."

Send immediately by express....."Obtain."

Send immediately by Adams express"Obtrude."

Send immediately by American express"Obtuse."

Send immediately by United States express....."Obverse."

Send immediately by mail or express, as cheaper..."Obvert."

Replies.

We can forward the goods inquired for upon receipt of order {at discount of / Our price is}"Occasion."

We can forward the goods inquired for within three days from receipt of order {at discount of / Our price is}"Occident."

We can forward the goods inquired for within one week from receipt of order {at discount of / Our price is}"Occupant."

We can forward the goods inquired for within two weeks from receipt of order {at discount of / Our price is}"Occupy."

Goods inquired for are not in stock. We are writing you fully and will forward the goods at the earliest possible date after receiving order {at discount of / Our price is} "Ocular."

We have only part of the goods ordered in stock. Shall we forward what we can at once?....."Officer."

We respectfully refer you to our terms of sale on page 9 of this catalogue. We will forward the goods ordered immediately upon your compliance therewith....."Operate."

*We also use **A. B. C. Telegraphic Code,** Fourth Edition.

Styles of Jaws.

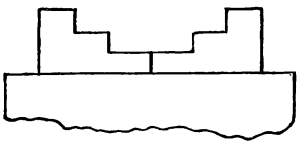
AS stated on page 8, misunderstandings in the execution of orders have most frequently occurred regarding the styles of Jaws required, because of the great variety of names in common use for similar shapes. To avoid such misunderstandings, we again **urge the use of numbers only,** or the exact designations given by the maker of the Chucks required.

Our regular Chucks of all sizes and classes are supplied with Jaws of the styles indicated in the accompanying diagrams.

All our Chucks in which the Jaws are directly actuated by a scroll, may be ordered with either of the four styles shown.

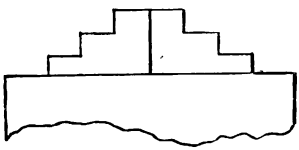
All our Chucks in which the Jaws are actuated by screws, are regularly fitted with the Solid Reversible Jaws shown on page 15 (Figure 5), which may be either No. 1 or No. 2 style, according to position when inserted. All Screw Chucks may be fitted to order with either No. 3 or No. 4 Jaws, which are reversible as to position, but of which one end only is pointed to approach the center closely.

Attention is also called to our Reversible Jaws for Scroll Chucks, described on page 16 (Figs. 7 and 8).



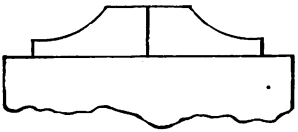
NO. 1.

No. 1 is the style most generally used for ordinary chucking work. This style is also known as the "Lathe" Jaw.



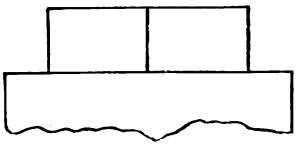
NO. 2.

No. 2 is designed for holding work such as rings, etc., which it is necessary to hold by the inside, exposing the outer surface of the work to the action of the tools; rods, drills, and the like, which pass through the Chuck, may also be conveniently held. This style is known as the "Drill" Jaw.



No. 3.

No. 3 is used for holding rods, drills, forgings, and work of any class passing through the Chuck. It is very suitable for use on Cutting Off and Milling Machines. The No. 3 Jaws do not project from the Chuck as far as the No. 1 and No. 2 styles.



No. 4.

No. 4 Jaws are plain blanks of the same height and length as the No. 1 and No. 2 styles, and are supplied soft. These may be shaped by the purchaser to hold any special work, and may be drilled and tapped, or otherwise fitted to receive any false Jaws used in holding soft metal, or in any special manufacturing operations. We wish to urge the importance and great convenience of Jaws of this style for manufacturing, as the expense and delay of obtaining special Jaws shaped and fitted by the chuck maker may many times be avoided by their use. The steel used is of a special quality which can be readily hardened if desired, after the Jaws have been suitably shaped. In this process care should be taken to avoid hardening the teeth.

Attention is also called to the **wide No. 4 Jaws** shown in Figure 83 (Page 89), which are made to order for special purposes, such as for **inserted dies or chasers,** etc.

Special Jaws.

Special Jaws are furnished to drawing or will be designed to hold any sample piece, whenever ordered, at special prices, quoted upon application. Our charges for such work are always reasonable, and prompt attention is given. Many times a small outlay for special Jaws will be much more than repaid on a single job, in time saved. Sets of such Jaws may be ordered separately and can usually be supplied to fit accurately. In such cases we prefer to have a sample Jaw from the Chuck for which the special Jaws are to be furnished.

Please Notice.

Please notice that when Scroll Chucks are ordered without definite specification as to the style of Jaws required, No. 1 Jaws will always be furnished. When Chucks are ordered with Two Sets of Jaws, No. 1 and No. 2 styles will be supplied, except upon definite instructions otherwise.

Reversible Jaws.

FIGURE 5 shows the Solid Reversible Jaw used in all sizes and styles of our regular Independent, Combination Screw, Universal Screw, and Combination Scroll Chucks. The long guiding grooves give the Jaw ample strength and wearing surface where it engages with the chuck body. The area of wearing surface which engages with the screw thread is also much greater than in any Chuck Jaw of similar size having the short full nut commonly provided. By the use of special tools, we are enabled to correct any inaccuracies in fitting and in the pitch of the screw threads, which may result from distortion in hardening, and can guarantee these Jaws to be well fitted both to the chuck bodies and to the screws, thereby securing the utmost durability and smoothness of operation. Breakages are almost totally unknown in Jaws of this style made by us.

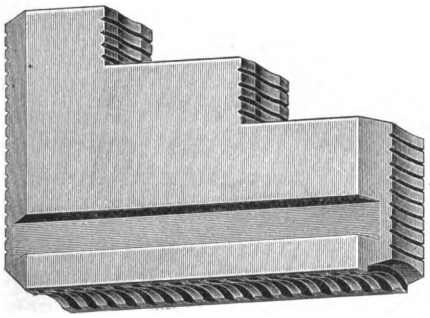


FIG. 5.

Attention is called to the unavoidable weakness and limited wearing surface of the common form of Jaw shown in Figure 6, where it engages with the chuck body. Our patented construction (the method of securing the Chuck Screw against end movement) enables us to use the improved Jaw shown in Figure 5 in all of our Screw Chucks, and obviates the necessity for providing separable Reversible Jaws, which are inconvenient on account of the small screws to be

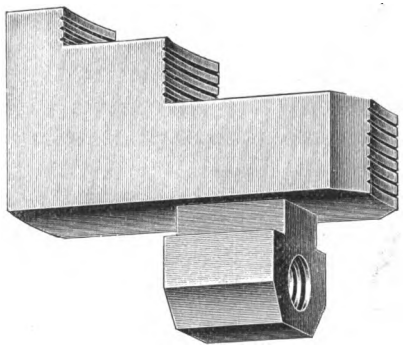


FIG. 6.

manipulated, and liable to be inaccurate because of the number of joints to wear loose during continued use. We unhesitatingly recommend the Solid Reversible Jaw above described, as the simplest, most conveniently reversed, and most durable Chuck Jaw ever devised.

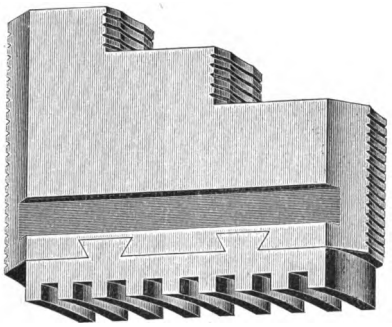


FIG. 7.

Figures 7 and 8 show the forms of Reversible Jaws which we have adopted for use in our Geared Scroll Chucks when required (see pages 40 and 41). The form shown in Figure 7 (patented by us in 1890) is best adapted to the smaller sizes, in which the Jaws may be very conveniently run out to be reversed. This style Jaw avoids the necessity for using small screws to fasten the parts, and the steps of the Jaws, being solid, may be trued up whenever necessary.

The form shown in Figure 8 is more satisfactory in the larger Chucks, in which the time required to run the Jaws out for reversing is of some consequence on account of their comparatively slower movement. The parts are also much larger, and the necessary fastening screw may be more substantial than is possible in the smaller sizes.

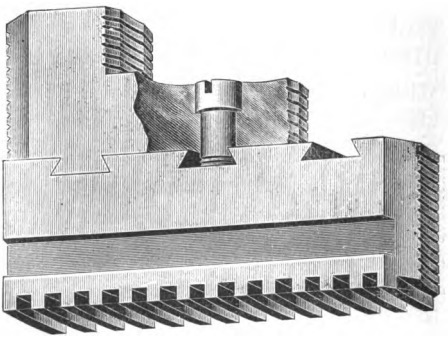


FIG. 8.

Geared Scroll Chucks up to and including 10½″ in diameter are furnished with Reversible Jaws like Figure 7. The larger sizes (12″ in diameter and over) are furnished with Reversible Jaws like Figure 8. Price lists and other information are given on pages 40-42. It should be understood that we do not recommend these Reversible Jaws for Geared Scroll Chucks as being fully equivalent to the two sets of solid jaws commonly furnished. The Reversible Jaws are not as convenient and are liable to be less accurate; they are also not as durable, having only one set of bottom sliders to engage with the scroll, but Chucks so fitted are less expensive than Chucks with two sets of Jaws.

Accuracy.

THE cost of absolute accuracy (assuming it to be possible) is so excessive that it can hardly be attained on a commercial scale in mechanical manufacture, so that it is now the standard practice to allow certain limits of inaccuracy in nearly all products, these limits varying according to the class of work.

Our Chucks are all very carefully tested for "truth" before being placed in stock. The higher grades are all required to test to a very much closer limit (about .002″) than is necessary in common use, and are fully guaranteed, as stated on page 9. A slightly greater variance from exactness is allowed in the cheaper grades.

This process of inspection and testing discloses a certain percentage of almost perfect Chucks which are specially designated by a particular inspection mark, and of which we usually have a very complete assortment of the various styles and sizes in stock. In any case where Chucks are to be used for exceptionally accurate work, Chucks of this class will be supplied if possible, provided the requirements are particularly explained in correspondence.

It is to be understood that we do not guarantee our Chucks to remain as accurate as when first tested, during regular use, except upon light work and when well taken care of. Our claim is that we take special pains in all the details of manufacture, and that it is our aim to produce only tools of the highest grade. We believe that in the qualities of accuracy and durability, our Chucks are not excelled by any in their respective classes.

Interchangeability.

NEARLY all the parts of our Chucks are made by special tools, and are kept as closely as possible to our standard gauges. These parts may usually be inserted with but very little fitting, unless the Chuck for which new parts are required is a very old one, in which case it would better be sent to us for repairs.

We have had occasional calls for **single Jaws** to replace broken ones of a set. The radial slots in all of our Chucks, in which the Jaws slide, are kept close to our standard sizes by limit gauges, and in this respect Jaws are practically interchangeable; but, in all Scroll Chucks, the teeth which engage with the scroll thread are in different positions with relation to the ends and steps of the Jaw for each Jaw of the set. The Jaws are finished in sets in the Chucks where fitted, and no two sets of Jaws of the same size are exactly alike as regards length and steps, except by chance. Under these circumstances, we cannot furnish single small Jaws to replace broken ones, except upon the express understanding that our customer will do for himself whatever fitting may be necessary to make the Chuck run true after inserting the new Jaw.

Full sets of Jaws will be supplied upon such orders except upon explicit request for single Jaws only, and reference to this paragraph (page 18-3) of our catalogue.

In ordering new Jaws it is advisable to send a Jaw from the Chuck as a sample. This will give us the size of the slot, and, if it is in any way different from our regular standard, will enable us to send new Jaws which will fit quite accurately.

Large Jaws, when needed, may be supplied singly, and are usually left soft to be finished by our customer. Such Jaws will be finished to match with the sample, if same is sent.

Repairing.

WE can repair Chucks (of our own make only) promptly, and nearly always at moderate cost. When Chucks are sent for repairs, please mail an order for the work required, instead of sending it with the Chucks, or, as sometimes happens, neglecting it altogether, and do not fail to attach your name to the box or package, for identification. We charge for the new parts required, and for the labor necessary in fitting, testing, etc.

We can also supply **separate repair parts** which can usually be fitted with but little trouble. (Please notice what is said above about Interchangeability.) When a duplicate part is ordered, it is necessary to send us the broken sample, or to **exactly specify the part,** and the size and style of the Chuck for which it is required.

Dealers, to whom such samples are frequently sent with orders for duplicates, are asked to notice that Chuck Jaws and Wrenches of our make are always stamped "The D. E. W. Co.," as a means of avoiding confusion and delay in referring such orders to the proper factory.

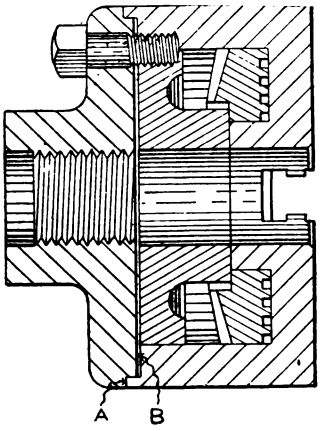


FIG. 9.

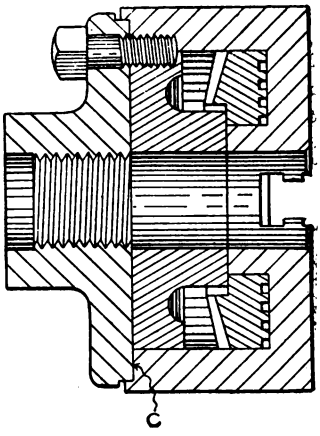


FIG. 10.

The Fitting and Care of Chucks.

CAREFUL attention should be paid to the accurate fitting of all Chucks, in order to secure the best results. The face plate, upon which the Chuck is to be mounted, should first be well fitted to the spindle, after which it should be turned to the proper diameter and thickness on the lathe where it is to be used, if possible.

The accompanying sketches show correct and incorrect methods of fitting, especially as regards small Chucks. **Fig. 9** shows the Face Plate formed with a shoulder (A) bearing against the rim of the Face Plate Recess, while a space is left at (B). This is an **incorrect method** of mounting our Chucks, since, in finishing, the rim of the Face Plate Recess is usually polished, and this process is liable to render the rim slightly untrue.

The various processes of manufacture are based on the chuck surface (C), and the plate, after having been faced off true, should be firmly bolted to the Chuck, so as to bear on this surface (C), as shown in Figure 10.

Do Not Alter the Chuck. The Chuck Jaws are sometimes screwed down upon the rim of a regular Lathe Face Plate (made true for the operation) and the Face Plate Recess turned out to receive the Chuck Plate, on the assumption that this method will correct any inaccuracy which may possibly exist in the chuck itself. This may give good results when skillfully done, but it destroys the manufacturer's standard size Face Plate Recess, and all possibility of testing the original accuracy of the Chuck, in case there should be any later complaint. It is more feasible in Screw Chucks than in Scroll Chucks, but in any case will only correct inaccuracies of the Chuck body,

and will not benefit imperfect screws or scrolls. **We must decline to be responsible for any untruth in Chucks in which the original face plate recess or tapered hole for mandrel has been changed in any way.** Please notice our guarantee on page 9. When sure that the Chuck is originally true, and this latter method is desirable for any reason, there can be no objection, except possible inconvenience and increased expense in case the Chuck should ever be returned for repairs.

To Avoid Unnecessary Projection, or overhang, Chucks with large center holes may frequently be fitted with the face plate reversed; i. e., with its hub projecting into the Chuck.

When the construction of the Chuck and the size of the center hole will permit it, it is sometimes desirable for the same reason to fit Independent Jaw Chucks directly to the Lathe Spindle without the use of a Face Plate. We frequently arrange **large Chucks** with **special sized holes and hubs** adapted to be so fitted, and invite correspondence on this subject from persons about to order large lathes with Chucks fitted complete.

Face Plate Castings will be furnished with any of our Chucks at reasonable prices whenever ordered. If an unusually large hub in proportion to diameter is required, this should be mentioned, with necessary dimensions. It will assist us in selecting the proper pattern, if a sketch giving dimensions of the lathe spindle nose is sent with all orders for such castings.

We cannot supply Chucks completely fitted, without an accurate gauge giving the size of the Spindle, as it is very difficult to fit threads exactly from dimensions only. When we have gauges on hand (see page 33) or when an accurate gauge (or the spindle itself) is sent to us, we will supply Chucks completely fitted, promptly, and at a reasonable extra charge to cover material and labor.

To Secure Durability, all Chucks should be cleaned and oiled frequently, and the mechanism should not be overstrained by the use of a longer wrench than necessary. It is just as possible to apply all one's strength to a small Chuck as to a large one, but it is quite impossible to make the mechanism of the small Chuck as strong as that of the larger one. Care and good judgment must therefore be used in tightening, if durability is expected.

When the work is such as to expose the mechanism to great wear from the dust of grinding operations, or to sand, scale, etc., from castings or forgings, the parts may be greatly protected by lightly stuffing the slots at each end of the Jaws (after they have been properly set for the work) with waste or similar material. Waste, when so stuffed, will usually permit sufficient movement of the Jaws to release and rechuck the work, without becoming displaced. Attention to this precaution will often greatly prolong the satisfactory service of the Chuck.

Chucks for Light Work.

THE accompanying cuts Pages 22 and 23) have been carefully made from a series of photographs, to illustrate the relative proportions of some of our Chucks when mounted on light Lathes. They show clearly the advantage and improved appearance of Chucks properly designed for this particular use. The new sizes of Champion Scroll and Independent Jaw Chucks, and the new light Geared Scroll Chucks, constitute a complete line of Chucks especially designed for such service, and are very attractive and durable tools.

We are frequently consulted as to the most satisfactory outfit of Chucks for such Lathes. We recommend a small size Geared Scroll Chuck (say 2½", 3", or 4" in diameter) fitted with two sets of Jaws, and a 4 Jaw Champion Independent Chuck, capable of holding work to the full capacity of the Lathe, as the most complete and desirable outfit. The small Chuck with the No. 2 Jaws will serve equally well as a Drill Chuck, or for holding rods and the like for cutting off, filing, or making screws, small studs and similar work (see Figs. 11 and 12). Being provided with the two styles of Jaws, it has also a wide range of usefulness in the smaller sorts of chucking work; while the larger chuck Fig. 15) will hold any work, either round, square, or eccentric, of which the Lathe is capable. Figure 16, in which the small Chuck is shown held in the larger one in an eccentric position, suggests an arrangement which is sometimes convenient in duplicating eccentric work.

The convenience of this outfit is enhanced by providing a fitting whereby the smaller Chuck may be mounted upon the tail spindle of the Lathe when desired, for drilling chucked work, etc.

The larger sizes of Champion Lever and Champion Geared Scroll Chucks (Figs. 13 and 14), being universal and perfectly balanced, are convenient on high speed Lathes, as in wood turning, and for light manufacturing.

For comparison with Figures 14 and 15 our regular pattern Geared Scroll and Independent Jaw Chucks of the same diameters are shown in Figures 17 and 18.

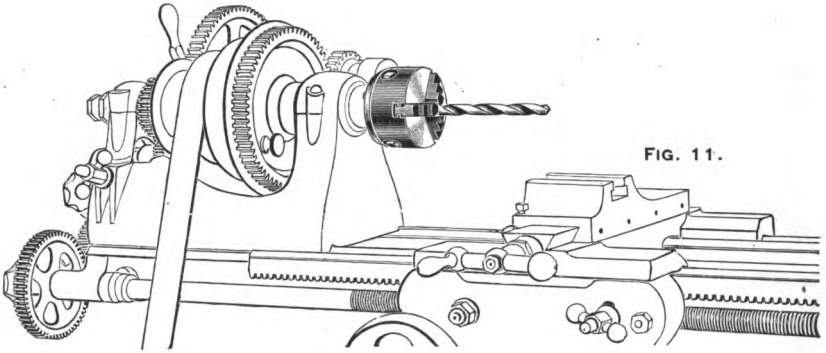


FIG. 11.

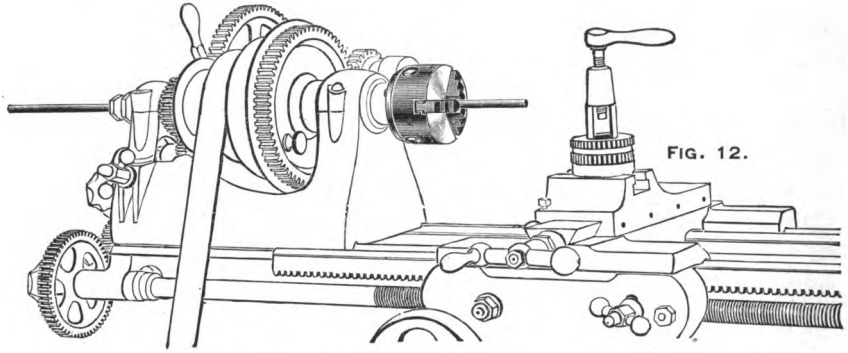


FIG. 12.

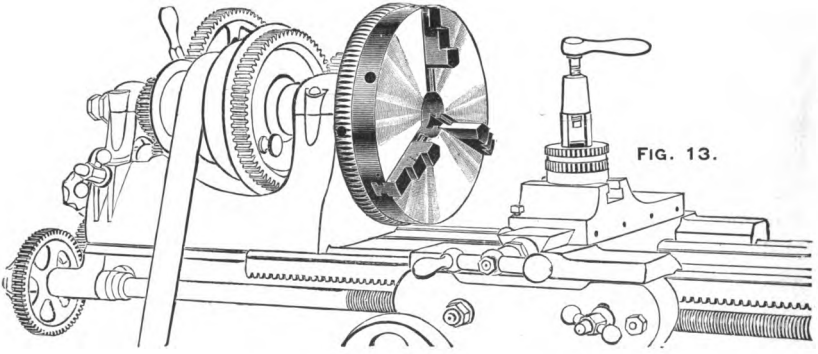


FIG. 13.

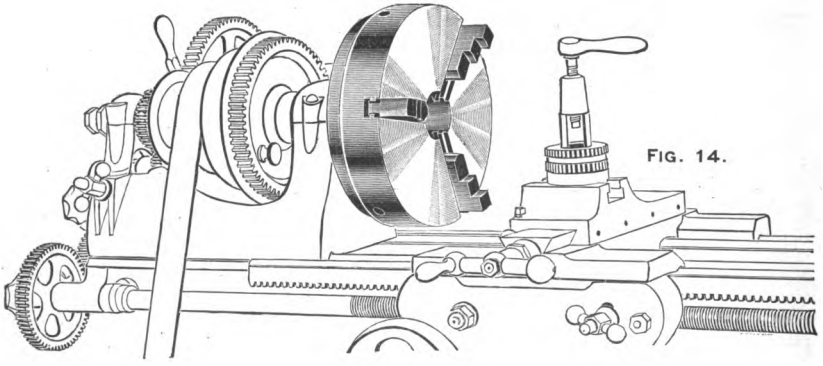


FIG. 14.

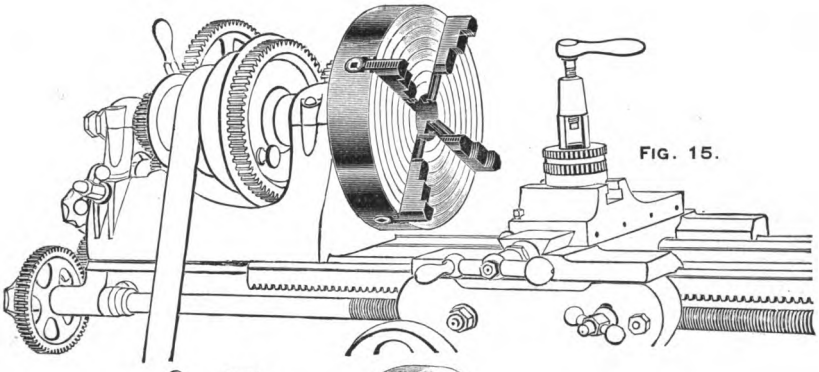


FIG. 15.

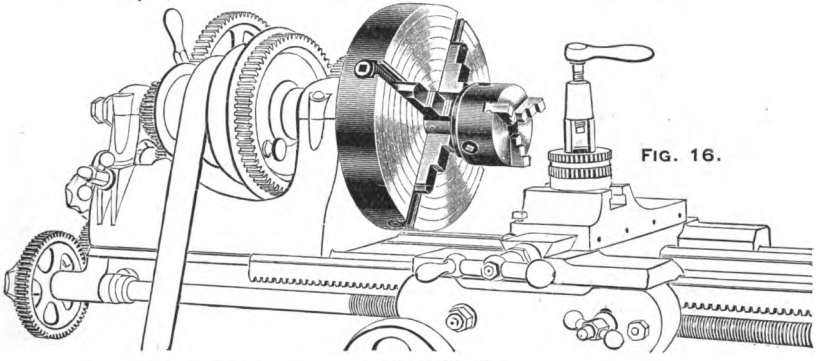


FIG. 16.

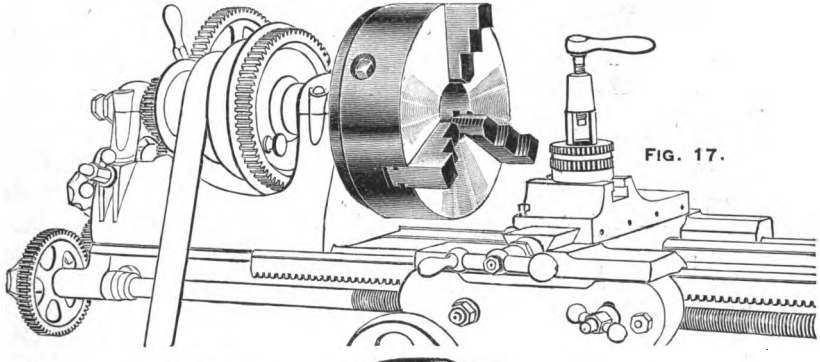


FIG. 17.

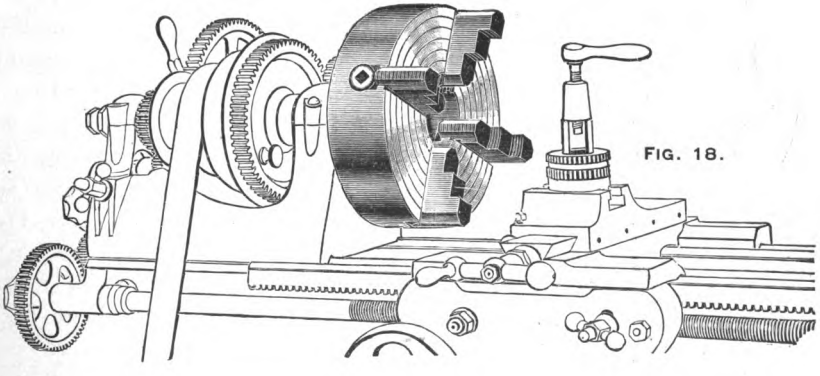


FIG. 18.

"Champion" Lever Scroll Chucks.

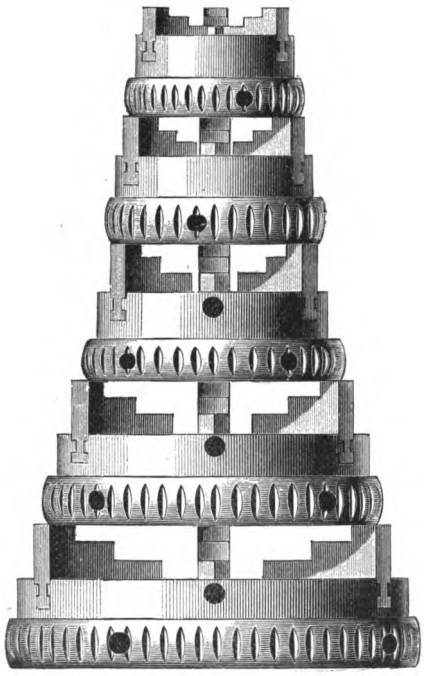


FIG. 19.

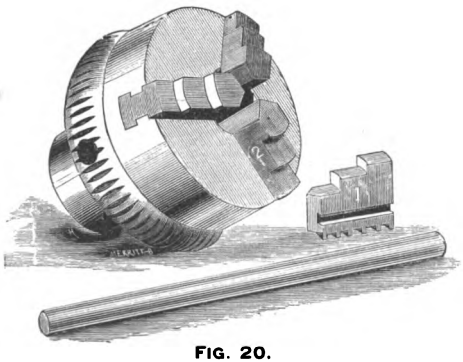


FIG. 20.

FIGURE 19 shows five sizes of this line of Chucks. All the sizes are of very attractive design, and well adapted for use on foot and light power Lathes, and for high speeds, as in wood turning. Although very light, they are strong and durable, as the shells and scrolls are made of malleable iron and the jaws of steel.

Figure 20 shows a 2″ Champion Lever Scroll Chuck arranged with a hub for attachment by means of a taper mandrel. It has a ½″ hole through the center, and is very convenient for holding drills, wire, etc. This is the style in which the 2″ and 2½″ sizes are furnished, unless specially ordered for Face Plate.

Figure 21 shows a 3″ Champion Lever Scroll Chuck arranged for attachment to the Lathe by a face plate. Sizes 3″ and over are kept in stock in this style only, but each may be arranged with hub for taper mandrel if so ordered. Chucks which are mounted on a face plate are usually preferred for use on hollow spindle Lathes, so that rods, etc., may be passed through if desired. Attention is called to Fig. 13, Page 22, showing a 7½″ Chuck so mounted.

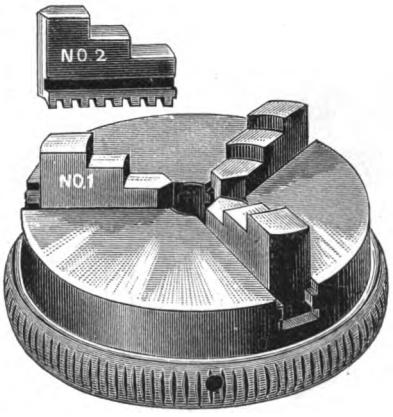


FIG. 21.

The Chucks of this line are operated by hand or lever, and are kept in stock with No. 1, No. 2, and 2 sets of Jaws only (see pages 13 and 14). No. 3 or No. 4 Jaws will be fitted when specially ordered, but as these latter styles are fitted only to order, a short delay will be involved in such cases. Four Jaw Chucks of this style are sometimes required, and although not included in the price list these can be furnished to order with reasonable promptness at special prices which will be quoted upon application.

These Chucks are Universal, or self-centering only, and do not have as much gripping power as Chucks which operate with a key, but are lower in price, and, for many uses, are unexcelled.

Price List A.—"Champion" Lever Scroll Chucks.

Size.	One Set Jaws.			Two Sets Jaws.		Extra Sets Jaws, ordered without Chuck.
	No. 1 Style. Code Word.	No. 2 Style. Code Word.	Price.	Code Word.	Price.	
2″ Mandrel	Act	Adz	$4.50	Accent	$5.75	$1.50
2″ Face Plate	Aft	Aid		Accept		
2½″ Mandrel	Ail	Aim	5.00	Accord	6.25	1.50
2½″ Face Plate	Air	Ant		Accost		
3″ Mandrel	Apt	Ark	5.50	Allay	6.75	1.50
3″ Face Plate	Arm	Art		Allow		
4″ Face Plate	Ash	Ask	6.50	Annex	8.00	2.00
5″ Face Plate	Asp	Awl	7.50	Append	9.00	2.00
6″ Face Plate	Awn	Aber	10.00	Arrest	12.00	2.50
7½″ Face Plate	Abut	Abox	12.00	Assist	14.00	2.50
9″ Face Plate	Abet	Amid	14.00	Attach	16.00	2.50

For explanation of Code see pages 10 and 11.

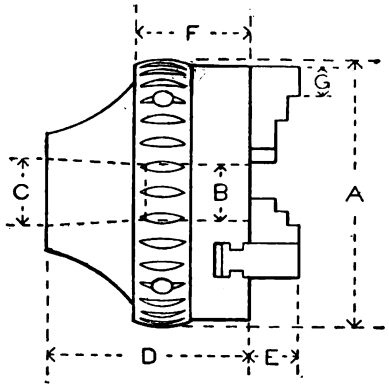


FIG. 22.

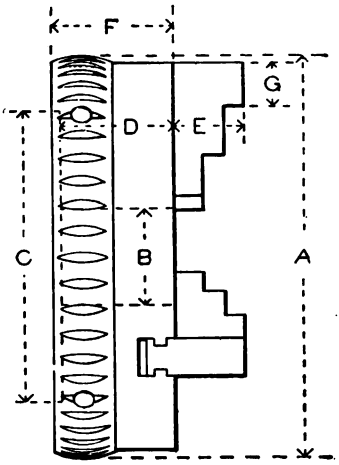


FIG. 23.

Approximate Dimensions (in Inches)

of

"Champion" Lever Scroll Chucks.

(See pages 24 and 25.)

Size.		Will Hold.	Approx. Weight, Pounds. (3 Jaw.)	A	B	C	D	E	F	G	Size.
2″	Mand.	2½	1	2 3/16	½	2 1/32 / 1 5/8	2 / 1 1/16	15/32	1 3/32	5/16	2″
	F. P.		¾								
2½″	Mand.	3⅛	1½	2 ¾	9/16	2 1/32 / 1 3/32	2 1/16 / 1 ⅛	15/32	1 3/16	5/16	2½″
	F. P.		1¼								
3″	Mand.	3 5/8	2	3 ¼	11/16	2 1/32 / 2 1/32	2 1/16 / 1 1/16	9/16	1 ⅛	11/32	3″
	F. P.		1¾								
4″	Mand.	5	3½	4 ⅛	1	2 3/4 / 2 31/32	2 3/16 / 1 3/16	11/16	1 ¼	½	4″
	F. P.		3¼								
5″	Mand.	6	4¾	5 ⅛	1	3 3/4	2 3/16 / 1 3/16	11/16	1 ¼	½	5″
	F. P.		4⅜								
6″	F. P.	7	8½	6 ⅛	1	3 25/32	1 5/16	⅞	1 ⅜	½	6″
7½″	F. P.	8	14½	7 11/16	1 5/8	3 25/32	1 ½	⅞	1 9/16	½	7½″
9″	F. P.	9½	22	9 3/16	1 5/8	3 25/32	1 9/16	⅞	1 5/8	9/16	9″

"Champion" Geared Scroll Chucks.

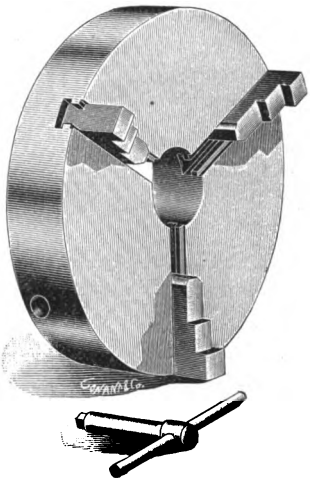


FIG. 24.

FIGURE 24 shows a 7½″ Chuck of this new line, and fairly represents the proportions of all the sizes. These Chucks are made with a solid body (having no joint), and possess all the well known advantages of our standard pattern 1884 Patent Geared Scroll Chucks see pages 36 and 37), but are lighter and adapted especially for use on light Lathes. Their proportions, particularly in the larger sizes, are much better suited to this service than the standard patterns (see Figure 14, page 22, which shows a 7½″ Chuck of this line mounted on a 10″ Lathe). They are amply strong for continued use, and are well made of excellent materials.

All the sizes are mounted by means of face plates, and are Universal or self-centering only. They are operated by keys, and their gripping power fully equals that of the standard patterns (see page 72).

The Chucks of this line are kept in stock with No. 1, No. 2, and 2 sets (No. 1 and No. 2) of Jaws only (see pages 13 and 14). No. 3 or No. 4 Jaws will be fitted when specially ordered, involving a short delay.

Price List J.—"Champion" Geared Scroll Chucks.

Size.		One Set Jaws.			Two Sets Jaws.		Extra Sets Jaws, ordered without Chuck.
		No. 1 Style Code Word.	No. 2 Style Code Word.	Price.	Code Word.	Price.	
3″	3 Jaws	Jab	Jam	$9.00	Jagg	$11.00	$2.25
	4 Jaws	Jail	Jant	10.00	Jeel	12.50	2.75
4″	3 Jaws	Jar	Jaw	11.00	Jeer	13.50	3.00
	4 Jaws	Jerk	Jest	12.50	Jeff	15.50	3.50
5″	3 Jaws	Jet	Jew	14.00	Joss	16.50	3.00
	4 Jaws	Jilt	Join	16.00	Jess	19.00	3.50
6″	3 Jaws	Jib	Jig	16.00	Jell	19.00	3.50
	4 Jaws	Jolt	Jowl	18.00	Jiff	22.00	4.50
7½″	3 Jaws	Jog	Jot	18.00	Jill	21.00	3.50
	4 Jaws	Jump	Junk	20.00	Jinn	24.00	4.50
9″	3 Jaws	Job	Jug	20.00	Joll	23.00	3.50
	4 Jaws	Just	Jury	22.00	Jutt	26.00	4.50

For explanation of code see pages 10 and 11.

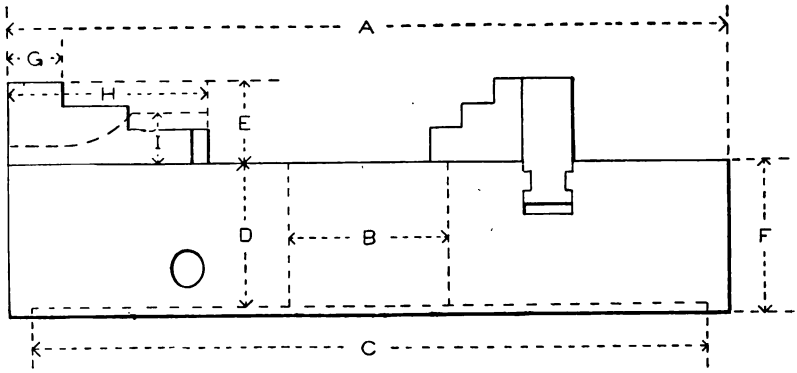


FIG. 25.

Approximate Dimensions (in Inches)

of

"Champion" Geared Scroll Chucks.

(See page 27.)

Size.	Will Hold.	Approx. Weight, Pounds. (3 Jaw.)	A	B	C	D	E	F	G	H	I	Size.
3″	3¼	2¾	3¼	⅝	3	1 3/16	⅝	1 ¼	11/32	1 1/16	½	**3″**
4″	4¼	4	4⅛	1	3 25/32	1 3/16	¾	1 ¼	½	1 ½	⅝	**4″**
5″	5	6	5	1¼	4 ⅝	1 3/16	¾	1 ¼	½	1 ½	⅝	**5″**
6″	6¼	9	6	1⅝	5 ⅝	1 ½	⅞	1 9/16	½	1 13/16	11/16	**6″**
7½″	8	14	7½	1⅝	7	1 ½	⅞	1 9/16	9/16	2 ⅛	11/16	**7½″**
9″	9½	22	9	1⅝	8 9/16	1 ½	⅞	1 9/16	9/16	2 ⅛	11/16	**9″**

"Champion" Independent Jaw Chucks.

IN GENERAL design and proportions, the Chucks of this line are similar to the "Champion" Lever Scroll and "Champion" Geared Scroll Chucks of corresponding sizes, and are particularly designed for light work. Each Chuck is provided with three or four solid reversible steel Jaws, operated by separate screws. Every variety of round, square, irregular, or eccentric work may be held in them to be operated upon by the tool, and they possess all the important advantages of our standard pattern Independent Chucks (see pages 54 and 55) which result from the patented method of construction, but are reduced in size and weight, in order that they may be more conveniently used on light Lathes.

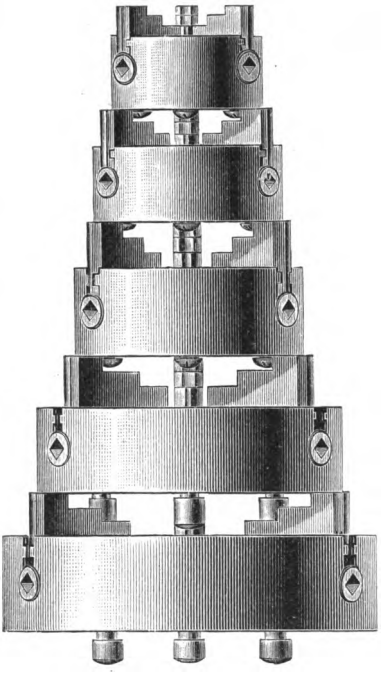


FIG. 26.

Figure 26 shows the five smallest sizes of the line, all with three Jaws.

Figure 27 shows a 5″ Chuck having four Jaws, and fairly represents the larger sizes. Attention is

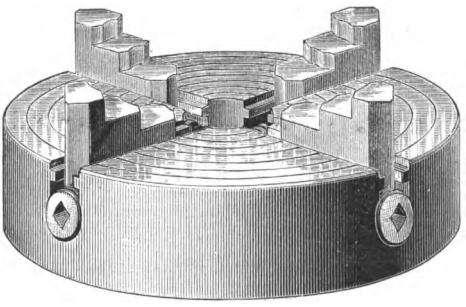


FIG. 27.

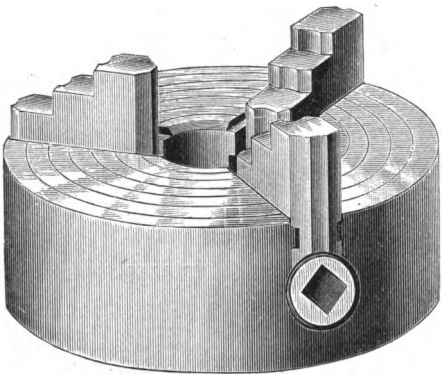


FIG. 28.

also called to Figure 15, page 23, where a 7½″ 4 Jaw Chuck is shown mounted on a 10″ Lathe.

Figure 28 shows a 3″ 3 Jaw Chuck of this style with one of its Jaws reversed.

Figure 29 shows the arrangement of the working parts in the smaller sizes, the frame of the Chuck being engraved in outline. The screws are grooved near the center, and are held in place in their radial recesses by the steel ring, which is properly fitted in the frame and secured against displacement by the face plate upon which the Chuck is mounted. The construction of the larger sizes is similar to that of the standard weight Independent Chucks shown on pages 54 to 56.

The improved construction of these Chucks affords the following important advantages:—

1st. The screw threads extend fully to the outside of the Chuck, so that the Jaws have greater traverse than in other Independent Chucks, and work larger than the diameter of the Chuck may be safely held.

2d. The thrust of the screws in gripping the work is received on hardened steel shoulders which are very durable, and consequently the back lash from end wear is very much reduced.

3d. The screws may be easily removed if desired, but are held in place in the Chuck, so that they will not fall out or become at all displaced when the Jaw is removed.

4th. Should a Jaw and screw become stuck together from lack of oil or any other cause they can be removed from the Chuck and separated without injury.

The Chucks of this line will hold with great firmness, and will receive work considerably larger than their diameter

(see the table of capacity and dimensions). All the sizes are attached to the Lathe by means of face plates, and are provided with circular lines on the face, by which to set the Jaws true for holding round work. There are no projecting screw heads, the ends of the screws having square recesses to receive the key. All the sizes are regularly fitted with solid reversible Jaws like Figure 5, page 15. No. 3 or No. 4 Jaws, or special Jaws of any shape, will be fitted to order when desired, involving a short delay.

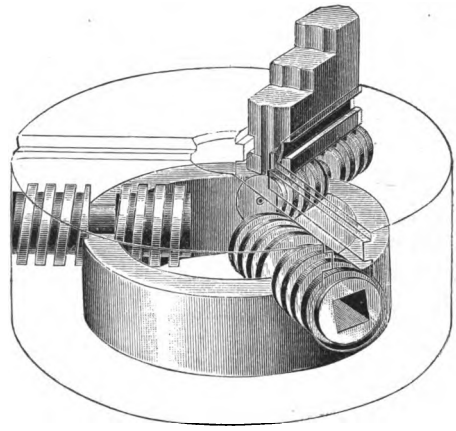


FIG. 29.

Price List B.—"Champion" Independent Jaw Chucks.

Size.	Three Jaws.			Four Jaws.		
	Number.	Code Word.	Price.	Number.	Code Word.	Price.
2″	B 1	Bag	$6.50	B 2	Bail	$8.00
2½″	B 3	Ban	7.50	B 4	Bait	9.00
3″	B 5	Bat	8.50	B 6	Band	10.00
4″	B 7	Bay	10.00	B 8	Bank	12.00
5″	B 9	Beg	12.00	B 10	Bark	14.00
6″	B 11	Bet	14.00	B 12	Bask	16.00
7½″	B 13	Bid	16.00	B 14	Bear	18.00
9″	B 15	Bin	18.00	B 16	Bend	20.00
10″	B 17	Bow	20.00	B 18	Brad	22.00

For explanation of code see pages 10 and 11.

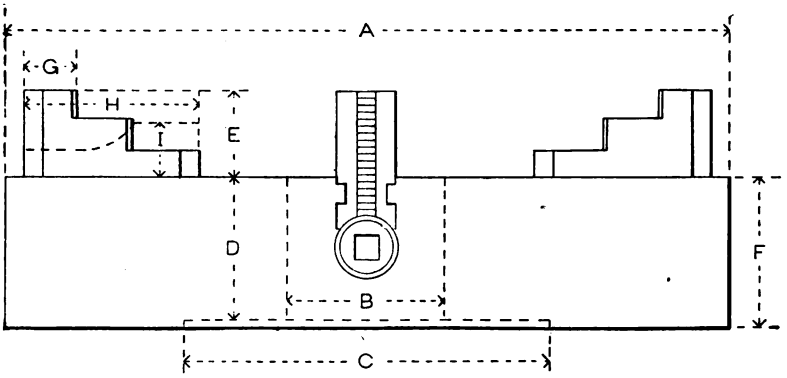


FIG. 30.

Approximate Dimensions (in Inches)

of

"Champion" Independent Jaw Chucks.

(See pages 29 to 31.)

Size.	Will Hold.	Approx. Weight, Pounds. (4 Jaw.)	A	B	C	D	E	F	G	H	I	Size.
2″	2¼	¾	2	7/16	1 13/16	15/16	15/32	1	5/16	13/16	3/8	**2″**
2½″	2¾	1¼	2½	½	1 31/32	15/16	15/32	1	5/16	13/16	3/8	**2½″**
3″	3¾	2	3	5/8	2 11/16	1 7/16	9/16	1 ½	3/8	1 ⅛	7/16	**3″**
4″	5	4	4	1	2 31/32	1 7/16	11/16	1 ½	½	1 ½	½	**4″**
5″	6	5¼	5	1	2 31/32	1 7/16	11/16	1 ½	½	1 ½	½	**5″**
6″	7¼	9	6	1⅝	3 25/32	1 ½	⅞	1 9/16	½	1 13/16	⅝	**6″**
7½″	8¾	12½	7½	1⅝	3 25/32	1 ½	⅞	1 9/16	½	1 13/16	⅝	**7½″**
9″	10½	15½	9	1⅝	3 25/32	1 ½	⅞	1 9/16	9/16	2 3/16	11/16	**9″**
10″	11½	19	10	1⅝	4 29/32	1 ½	⅞	1 11/16	⅝	2 3/16	11/16	**10″**

Fitting Chucks for Light Work.

TO accommodate our patrons, we have made a collection of the spindle nose gauges used by some leading makers of light Lathes, which have been sent to us by these Lathe makers as conforming to their standards for the various styles and sizes. We are thus enabled to supply Chucks fitted with face plates for any of these Lathes, when specially ordered; or, if preferred, we can furnish face plate castings bored and threaded ready to screw on, which may be finished to the proper diameter and accuracy on the Spindle where the Chuck is to be mounted. At present (January, 1896) we have gauges for the following makes and sizes:—

F. E. REED & CO., 10″ and 11″ Engine Lathes.
W. F. & JOHN BARNES CO., Nos. 4, 4½, 5, 5½, and 6.
SENECA FALLS MFG. CO., "Crown" and "Star."
W. C. YOUNG MFG. CO., Nos. 1, 2, 3, and 4.

It should not be understood that we recommend ordering fitted face plates of us as a better method than sending the required Chucks to the Lathe maker to be fitted, but the plan is a great convenience when the Lathe for which Chucks are ordered is in use, or has already been delivered. This method gives us no opportunity of testing for accurate results after the Chuck is mounted, but in general we have found (after having supplied many Chucks fitted in this manner) that the various spindles are kept closely to the standard sizes, and that plates fitting these gauges have given no trouble.

Finished Plates.

Finished plates will be furnished with any of our Chucks which may be selected, at the following net prices:—

Diam. of Chuck,	2″	2½″	3″	4″	5″	6″
Price,	$1.25	1.25	1.40	1.50	1.60	1.70

Diam. of Chuck,	7½″	9″	10″	10½″	12″
Price,	$1.85	2.00	2.25		

Semi-Finished Plates.

Face plate castings, bored, threaded, and with hub faced true with the thread, will be furnished at the following prices:—

Diam. of Chuck,	2″	2½″	3″	4″	5″	6″
Price,	$0.60	.60	.70	.80	.90	1.00

Diam. of Chuck,	7½″	9″	10″	10½″	12″
Price,	$1.10	1.20	1.30		

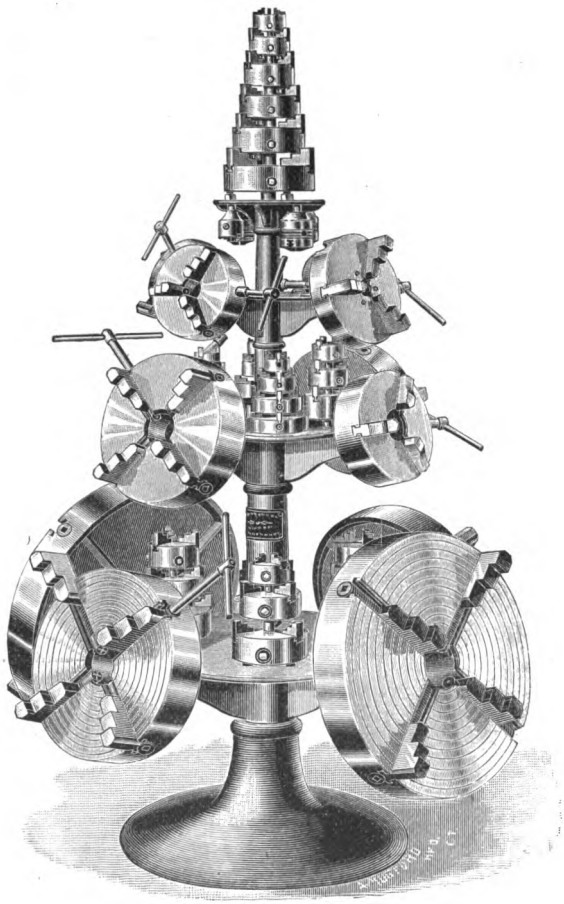


FIG. 31.

Revolving Display Stand.

Chucks for Regular Work.

THE requirements in this general class are extremely varied, as it embraces all the kinds suited to the usual manufacturing operations. We have given these various requirements a great deal of careful study, and have made many additions to our line of such Chucks, all of which embody special improvements, to which we now invite the attention of the mechanical public.

1884 Patent Geared Scroll Chucks.

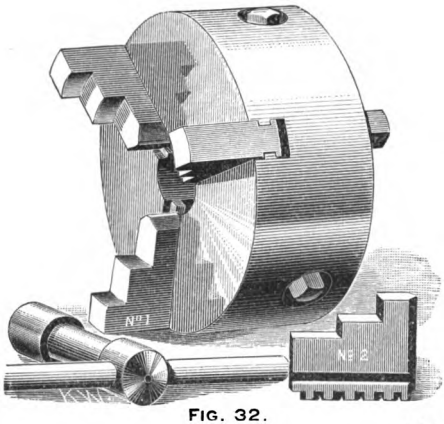


FIG. 32.

IN all manufacturing where circular pieces are to be held for successive duplicate chucking operations, the universal Geared Scroll Chuck is indispensable on account of its convenience, gripping power (see page 72), durability and low price.

We wish to call the attention of those using such Chucks to our important improvements in construction. **The distinctive difference** between our 1884 Patent Geared Scroll Chucks, and those of other makes, is clearly shown in Figures 33 and 34, and consists in making the **front plate or body,** in which the scroll and jaws are fitted, **of only one piece,** and directly attaching this piece to the face plate of the Lathe. The body of the Chuck is thus made **without any joint** and is very deep under the jaw, so that there is no danger of breakage from the corner of the slot to the joint. The increased strength of our Chuck at this point is a very great advantage which should receive the careful notice of buyers. In all other details of construction, and in quality of materials employed, these tools are not excelled by any Chucks of similar class.

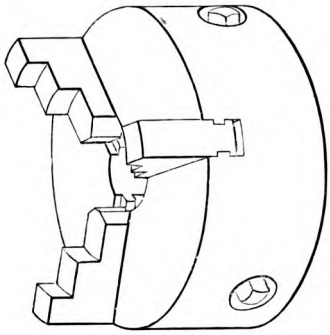


FIG. 33.

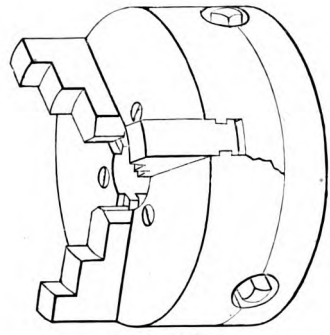


FIG. 34.

Each Chuck has three pinions,

which distribute the wear evenly, and afford perfect balance and the utmost convenience in use. These have tapered bearings in the body of the Chuck, and may be easily removed or inserted, from the inside. A back plate which closes the opening in the Chuck Body and supports the inner ends of the pinions, is held in place by the Face Plate Screws, which also serve to attach the Chuck to the Face Plate. The construction is clearly shown in Figure 35 and we believe it to be superior to any Geared Scroll Chuck heretofore produced.

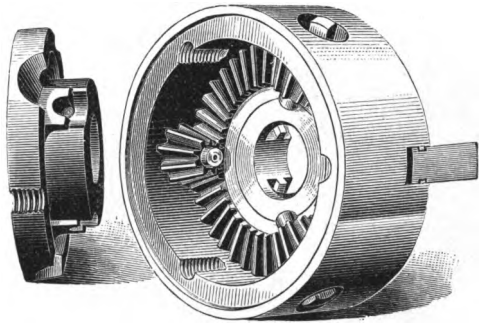


FIG. 35.

Figure 36 shows a Chuck of this line fitted with four No. 1 style Jaws. Four Jaw 1884 Chucks are provided with only two pinions.

Figure 37 shows an 1884 Patent Chuck fitted with three No. 3 Jaws. This is very useful as a milling machine Chuck, and the larger sizes are perfectly adapted for use as cutting off Chucks, since they have large holes (see table of dimensions), and are very strongly made. Attention is also called to Fig. 17, page 23, showing the relative proportions of a 7½" "1884 Patent" Chuck.

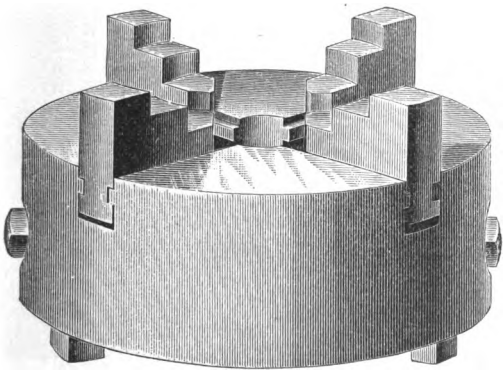


FIG. 36.

Each Chuck of this line is operated by means of a key and will hold work with great firmness (see page 72). All the sizes are designed to be mounted by means of Face Plates. The 2½" and 3" sizes may be arranged for taper mandrels, when specially ordered, involving a short delay.

These Chucks are kept in stock with three or four Jaws and are fitted with either No. 1, No. 2, No. 3, No. 4, or two

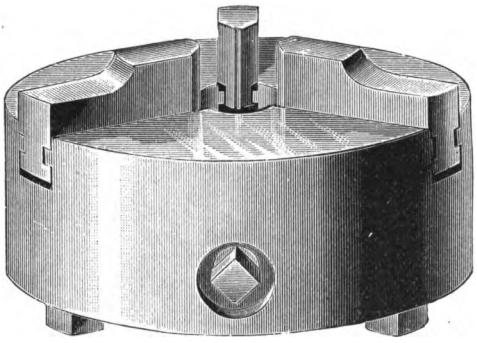


FIG. 37.

sets of Jaws. Special Jaws of any shape, to drawing or to hold sample piece, will be fitted to order when desired, involving a short delay (see description of "Styles of Jaws," pages 13 and 14).

Please notice our guarantee (page 9 and what is said about accuracy (page 17) and interchangeability (page 18). Also the heavier Chucks of similar design described on pages 74 and 75.

Price List G.—1884 Patent Geared Scroll Chucks.

Size.	One Set Jaws.			Two Sets Jaws.		Extra Sets Jaws, ordered without Chuck.
	No. 1 Style. Code Word.	No. 2 Style. Code Word.	Price.	Code Word.	Price.	
2½″ 3 Jaws	Gab	Gad	$7.50	Gaff	$9.00	$2.00
2½″ 4 Jaws	Gain	Gait	8.50	Gall	10.50	2.50
3″ 3 Jaws	Gag	Gas	10.00	Guss	12.00	2.50
3″ 4 Jaws	Gash	Gasp	11.00	Goff	13.60	3.00
4″ 3 Jaws	Gan	Gap	12.00	Grill	14.40	3.00
4″ 4 Jaws	Gear	Germ	13.20	Gull	16.40	3.75
5″ 3 Jaws	Gat	Gay	15.00	Glass	18.00	3.50
5″ 4 Jaws	Gest	Gild	16.50	Griff	20.50	4.50
6″ 3 Jaws	Get	Gem	18.00	Greet	21.60	4.00
6″ 4 Jaws	Gird	Grit	19.80	Groom	24.60	5.25
7½″ 3 Jaws	Gib	Gig	20.00	Grass	24.00	4.50
7½″ 4 Jaws	Glad	Glib	22.00	Goss	27.30	6.00
9″ 3 Jaws	Gar	Git	24.00	Good	28.80	5.50
9″ 4 Jaws	Glow	Gnaw	26.40	Gloom	32.80	7.50
10½″ 3 Jaws	Gif	Gip	27.00	Goll	32.40	6.50
10½″ 4 Jaws	Goad	Grab	29.70	Gruff	37.00	8.50
12″ 3 Jaws	Got	Gum	30.00	Green	36.00	7.50
12″ 4 Jaws	Grin	Grip	33.00	Guess	41.00	9.50
15″ 3 Jaws	Gun	Guy	40.00	Graff	48.00	10.00
15″ 4 Jaws	Grow	Gush	44.00	Gross	54.60	12.00

For explanation of code see pages 10 and 11.

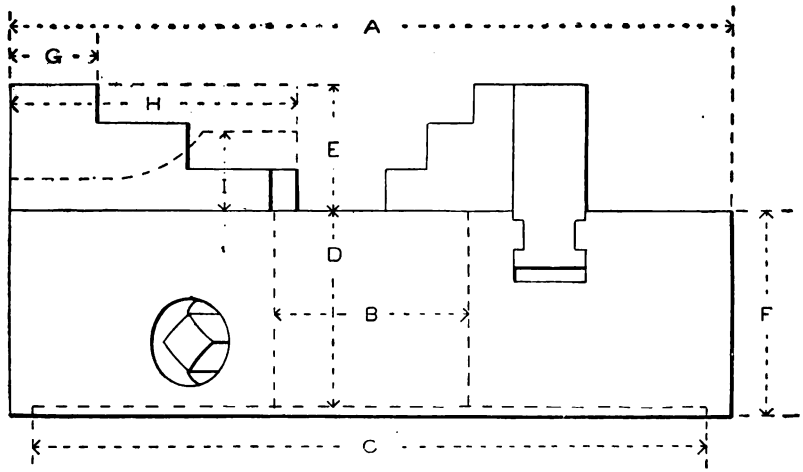


FIG. 38.

Approximate Dimensions (in Inches)

of

1884 Patent Geared Scroll Chucks.

Size.	Will Hold.	Approx. Weight, Pounds. (3 Jaw.)	A	B	C	D	E	F	G	H	I	Size.
2½″	3	1¾	2¾	⅝	2⅜	1 7/16	½	1½	⅜	1⅛	7/16	**2½″**
3″	3⅜	3	3¼	21/32	2 31/32	1 9/16	⅝	1⅝	⅜	1 3/16	½	**3″**
4″	4¼	5¾	4⅛	1	3 25/32	1 15/16	13/16	2	½	1½	⅝	**4″**
5″	5⅜	8¾	5	1¼	4⅝	2 1/32	¾	2⅛	9/16	1 13/16	⅝	**5″**
6″	6¾	12½	6	1⅝	5⅝	2 1/32	1 1/16	2⅛	⅝	2 3/16	11/16	**6″**
7½″	8¼	21	7½	2	7	2 3/32	1 3/16	2⅜	13/16	2¾	13/16	**7½″**
9″	10½	33	9	2⅝	8 9/16	2 17/32	1 9/16	2⅝	15/16	3¼	1	**9″**
10½″	11½	42	10½	3	9 13/16	2 9/16	1 9/16	2 11/16	15/16	3¼	1	**10½″**
12″	13½	58	12	4	7	2¼	1⅞	2¾	1⅛	3 15/16	1⅛	**12″**
15″	16¼	94	14 9/16	3⅝	8 5/16	2 5/16	2 3/16	2 13/16	1¼	4 7/16	1½	**15″**

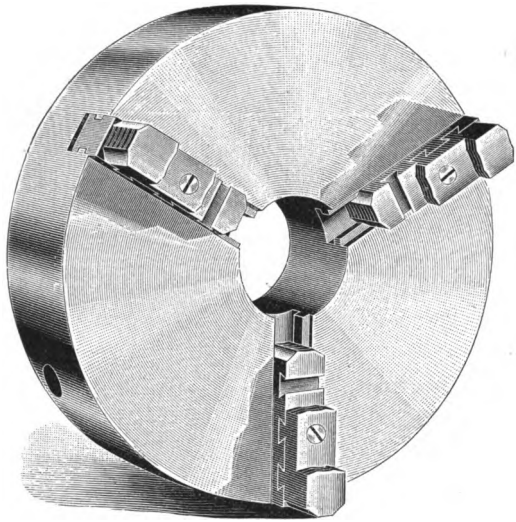


FIG. 39.

Geared Scroll Chucks with Reversible Jaws.

TO meet the demand for Geared Scroll Chucks having Reversible Jaws, we now offer a new line so fitted. These Chucks are similar to the 1884 Patent Chucks described on pages 36-38, in that they also embody the important improvements in construction which are there explained, **the bodies being made without any joint** and very strong underneath the Jaw.

In addition, we have made a further improvement in the method of mounting the pinions, which largely increases the area of wearing surface. This improvement (patented Dec. 17, '95) is shown in the sectional view (Figure 40) and consists in providing the pinion "A" with a socket and mounting it wholly within the back plate of the Chuck. It is revolved by the key "B" which is inserted through a hole made in the body in line with the axis of the pinion. The key fits this hole, and, when it is inserted, the pinion is practically mounted on a shaft having long full bearings on both sides of the gear teeth, giving great durability. The new Chucks are fitted with Reversible Jaws of the forms described on page 16 and are made in the best manner and of the best materials.

The sizes up to and including 10½" (Fig. 40) are fitted with Jaws which may be separated after they are run out of the

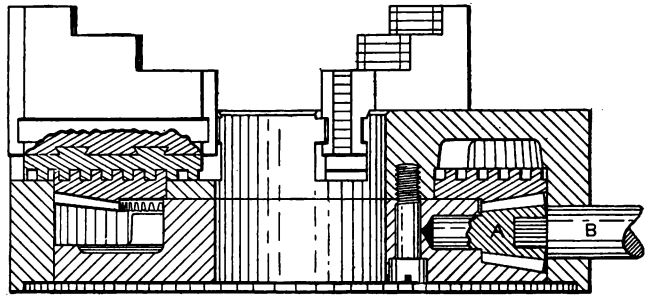


FIG. 40.

Chuck (see Fig. 7, page 16). The upper sections are then reversed and the Jaws again inserted. This form of Jaw (patented by us in 1890) avoids the use of small screws and the steps are left solid, so that they may be trued up or specially shaped whenever desired.

The larger sizes Fig. 39) are fitted with Jaws having separable top sections, as shown in Figure 8, page 16; the parts being large enough in these sizes to allow the use of substantial fastening screws.

The Chucks of this line are kept in stock with only the regular form of Jaw as shown, which may be either No. 1 or No. 2 style, according to position when inserted.

Price List S.—Reversible Jaw Geared Scroll Chucks.

Size.	Three Jaws.			Four Jaws.			Extra Sets Jaws, ordered without Chuck.	
	No.	Code Word.	Price.	No.	Code Word.	Price.	3 Jaws.	4 Jaws.
2½″	S 1	Sag	$8.00	S 2	Sack	$9.00	$2.75	$3.25
3″	S 3	Saw	10.00	S 4	Sail	11.00	3.25	3.75
4″	S 5	Set	12.00	S 6	Salt	13.20	4.00	5.00
5″	S 7	Sew	15.00	S 8	Sand	16.50	4.50	5.50
6″	S 9	Sin	18.00	S 10	Scan	19.80	5.00	6.50
7½″	S 11	Sip	22.00	S 12	Scar	24.00	6.00	7.50
9″	S 13	Sit	26.00	S 14	Scud	28.00	7.50	10.00
10½″	S 15	Sod	29.00	S 16	Seam	32.00	8.50	11.00
12″	S 17	Sun	33.00	S 18	Sear	36.00	10.00	12.00
15″	S 19	Sup	44.00	S 20	Seat	48.00	12.50	15.00

For explanation of code see pages 10 and 11.

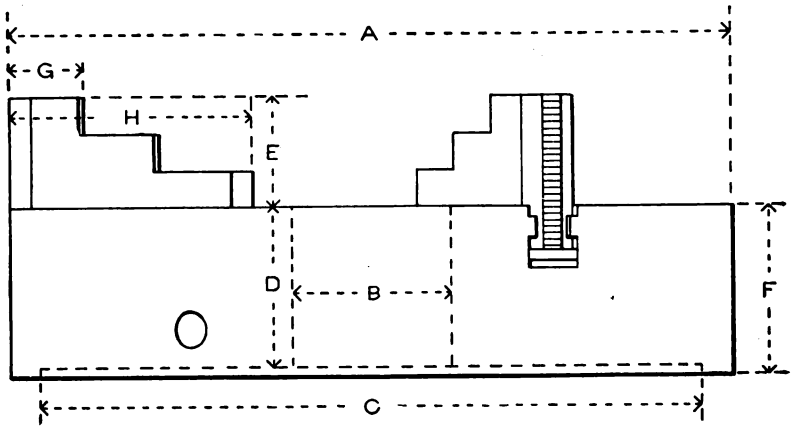


FIG. 41.

Approximate Dimensions (in Inches)

of

Reversible Jaw Geared Scroll Chucks.

(See pages 40 and 41.)

Size	Will Hold.	Approx. Weight, Pounds. (3 Jaw.)	A	B	C	D	E	F	G	H	Size.
2½″	3	1⅞	2¾	⅝	2⅜	1 9/16	½	1⅝	7/16	1 3/32	**2½″**
3″	3⅜	3¼	3¼	21/32	2 31/32	1 11/16	11/16	1¾	7/16	1 3/16	**3″**
4″	4¼	6	4⅛	1	3 25/32	2 1/32	⅞	2 3/32	15/32	1 9/16	**4″**
5″	5⅜	9¼	5	1¼	4⅝	2 5/32	⅞	2¼	⅝	1 13/16	**5″**
6″	6¾	13¾	6	1⅝	5⅝	2 5/32	1 1/16	2¼	⅝	2 3/16	**6″**
7½″	8¼	23	7½	2	7	2 13/32	1⅜	2½	29/32	2 11/16	**7½″**
9″	10½	37	9	2⅝	8 9/16	2 25/32	1 11/16	2⅞	1	3 3/16	**9″**
10½″	11½	48	10½	3	9 13/16	2 13/16	1⅝	2 15/16	1	3 3/16	**10½″**
12″	13½	58	12	4	7	2¼	1⅞	2¾	1 3/16	3 15/16	**12″**
15″	16¼	94	14 9/16	3⅝	8 5/16	2 5/16	2 3/16	2 13/16	1¼	4 7/16	**15″**

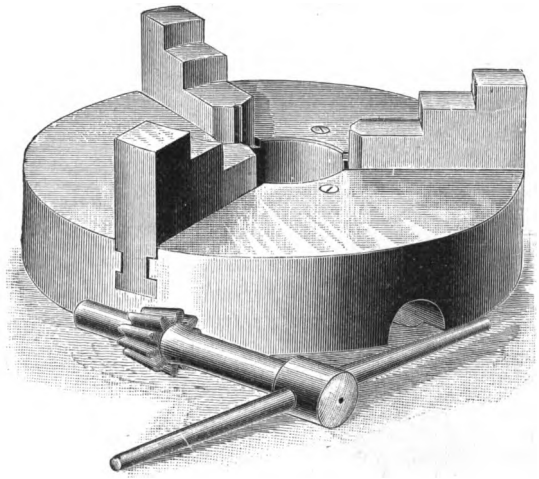


FIG. 42.

Improved Geared or Pinion Key Chuck.

THESE Chucks are of an earlier pattern than the 1884 Patent Chucks described on page 36, and have been manufactured by us for many years. Wherever they have been used, they are favorably known as convenient and durable tools, and are still in such demand that we continue to carry them in stock. The method of construction allows them to be made **very thin,** thus bringing the work near the Lathe Spindle. This feature also adapts them for use in **narrow spaces** for a variety of special work, and as parts of special tools in which strong universal Chucks are required. They are lighter than the 1884 Patent Chucks, but heavier than the Champion Geared Scroll Chucks of corresponding sizes, described on page 27, and are suitable for many special uses.

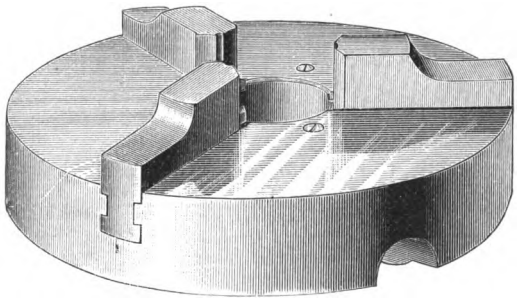


FIG. 43.

The working parts of these Chucks are of steel, and are accurately fitted. Three openings for the key are provided, one of which is always in a convenient position to receive it

whenever it is to be applied. The pinion is a part of the key, as shown.

Figure 42 shows a 9″ Chuck of this line fitted with No. 1 Jaws, and the pinion key.

Figure 43 shows the same size Chuck, but fitted with three No. 3 Jaws. This is a useful milling machine and special Chuck, and is convenient for use as a cutting off Chuck, requiring but little room (see the table of dimensions).

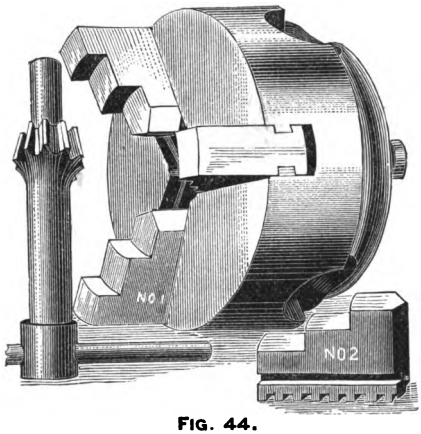


FIG. 44.

Figure 44 shows a 3″ Chuck, complete with key, fitted with three No. 1 Jaws, and showing relative style of No. 2 Jaws.

All the Chucks of this line will hold work firmly (see page 72) and are designed to be mounted on Face Plates.

These Chucks are kept in stock with three or four Jaws, and fitted with either No. 1, No. 2, No. 3, No. 4, or two sets of Jaws. Four Jaw Chucks are provided with only two openings for the key. Special Jaws of any shape, to drawing, or to hold sample piece, will be fitted to order when desired, involving a short delay. (See "Styles of Jaws," pages 13 and 14.)

Please notice our guarantee (page 9) and what is said about accuracy (page 17) and interchangeability (page 18).

Price List W.—Improved Geared or Pinion Key Chucks.

Size.	One Set Jaws.			Two Sets Jaws.		Extra Sets Jaws, ordered without Chuck.
	No. 1 Style. Code Word.	No. 2 Style. Code Word.	Price.	Code Word.	Price.	
3″ 3 Jaws	Wad	Wag	$10.00	Wall	$12.00	$2.50
3″ 4 Jaws	Waft	Wail	11.00	Well	13.60	3.00
4½″ 3 Jaws	Wan	War	14.00	Weed	17.00	3.50
4½″ 4 Jaws	Wait	Walk	15.40	Week	19.00	4.50
6″ 3 Jaws	Wax	Wed	18.00	Weep	21.60	4.00
6″ 4 Jaws	Want	Warm	19.80	Wood	24.60	5.25
9″ 3 Jaws	Wet	Win	24.00	Woof	28.80	5.50
9″ 4 Jaws	Wash	Weld	26.40	Wool	32.80	7.50

For explanation of code see pages 10 and 11.

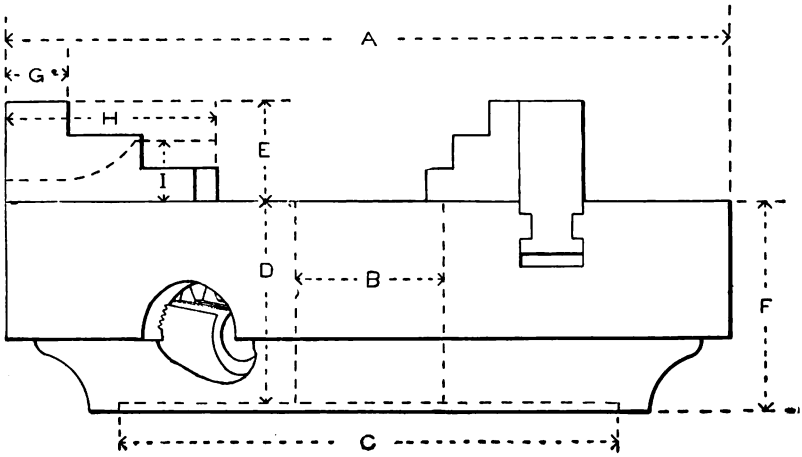


FIG. 45.

Approximate Dimensions (in Inches)

of

Improved Geared or Pinion Key Chucks.

Size.	Will Hold.	Approx. Weight, Pounds. (3 Jaw.)	A	B	C	D	E	F	G	H	I	Size.
3″	$3\frac{3}{8}$	2	3	$\frac{21}{32}$	$2\frac{1}{4}$	$1\frac{7}{16}$	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{3}{8}$	$1\frac{3}{16}$	$\frac{1}{2}$	**3″**
4½″	$5\frac{1}{8}$	6	$4\frac{1}{2}$	1	$3\frac{7}{32}$	$1\frac{7}{8}$	$\frac{13}{16}$	$1\frac{15}{16}$	$\frac{1}{2}$	$1\frac{13}{16}$	$\frac{5}{8}$	**4½″**
6″	$6\frac{5}{8}$	$11\frac{1}{2}$	6	$1\frac{1}{2}$	$3\frac{25}{32}$	$2\frac{1}{8}$	$1\frac{1}{16}$	$2\frac{3}{16}$	$\frac{5}{8}$	$2\frac{3}{16}$	$\frac{11}{16}$	**6″**
9″	$10\frac{1}{2}$	31	9	$2\frac{5}{8}$	$4\frac{29}{32}$	$2\frac{3}{16}$	$1\frac{9}{16}$	$2\frac{1}{4}$	$\frac{15}{16}$	$3\frac{1}{4}$	1	**9″**

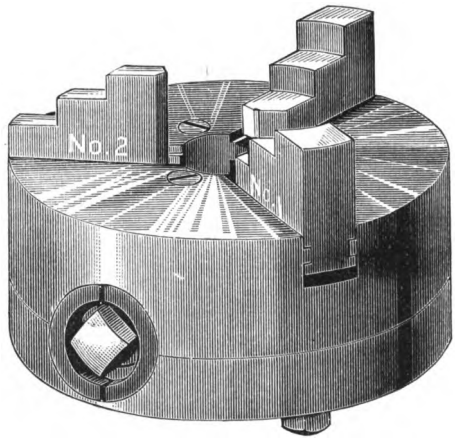


FIG. 46.

1866 Patent Geared Scroll Chucks.

FIGURE 46 shows an early form of the Whiton Geared Scroll Chuck, which has been widely sold, and for which we still receive orders from persons who have been pleased with its satisfactory service. The construction employed is very durable. We keep a small assortment of these Chucks on hand from which orders for this particular style can be filled promptly. This Chuck has but one pinion and opening for the key.

The 2″ Chuck of this line is arranged for attachment by a taper mandrel, and is the same as our 2″ Geared Drill Chuck (page 91) except fitted with Jaws for Lathe work. This 2″ Chuck is arranged for Face Plate when specially ordered. The larger sizes are arranged only for Face Plate.

These Chucks are furnished with three Jaws only, of either of the usual forms, or with two sets (see "Styles of Jaws," page 13).

Price List N.—1866 Patent Geared Scroll Chucks.

Size.	One Set Jaws.			Two Sets Jaws.		Extra Sets Jaws, ordered without Chuck.
	No. 1 Style. Code Word.	No. 2 Style. Code Word.	Price.	Code Word.	Price.	
2″ Mandrel	Nab	Nag	$6.50	Need	$8.00	$2.00
2″ Face Plate	Net	Nip	6.50	Nook	8.00	2.00
3″ Face Plate	Nail	Nard	10.00	Noon	12.00	2.50
4½″ Face Plate	Nash	Nest	14.00	Null	17.00	3.50

For explanation of code see pages 10 and 11.

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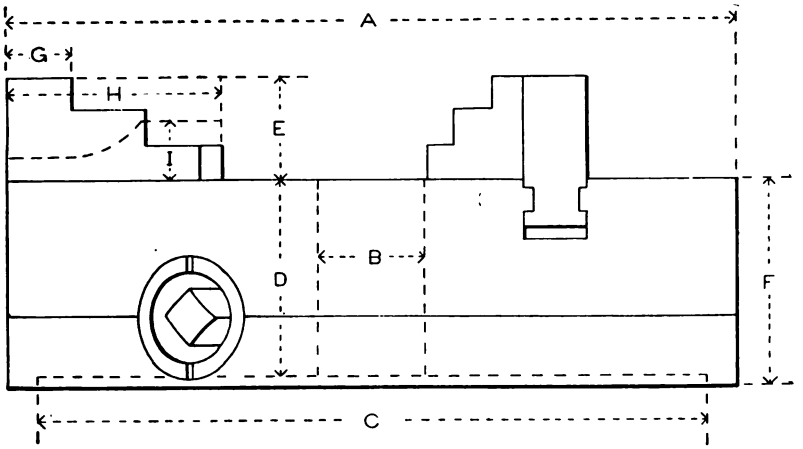


FIG. 47.

Approximate Dimensions (in Inches)

of

1866 Patent Geared Scroll Chucks.

Size.	Will Hold.	Approx. Weight, Pounds. (3 Jaw.)	A	B	C	D	E	F	G	H	I	Size.
2″	$2\frac{1}{8}$	1	2	$\frac{5}{16}$	$1\frac{5}{8}$	$1\frac{1}{2}$	$\frac{3}{8}$	$1\frac{9}{16}$	$\frac{1}{4}$	$\frac{13}{16}$	$\frac{7}{16}$	**2″**
3″	3	$2\frac{1}{4}$	3	$\frac{21}{32}$	$2\frac{11}{16}$	$1\frac{1}{2}$	$\frac{5}{8}$	$1\frac{9}{16}$	$\frac{3}{8}$	$1\frac{3}{16}$	$\frac{1}{2}$	**3″**
4½″	5	$6\frac{1}{2}$	$4\frac{1}{2}$	1	$3\frac{25}{32}$	$1\frac{7}{8}$	$\frac{7}{8}$	$1\frac{15}{16}$	$\frac{1}{2}$	$1\frac{3}{4}$	$\frac{5}{8}$	**4½″**

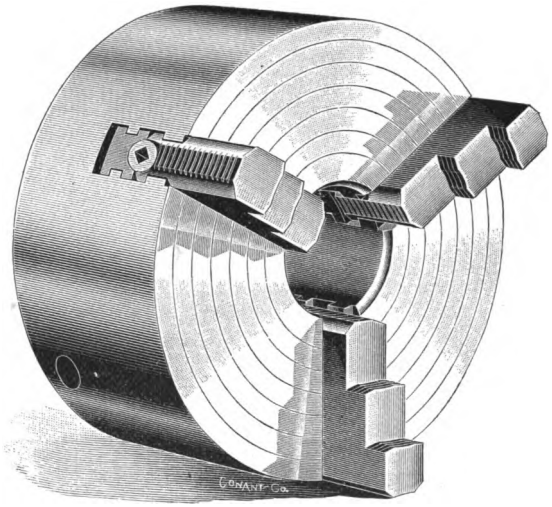


FIG. 48.

Geared Scroll Combination Chucks.

WE invite attention to this new line of Chucks, in which are combined a number of the most desirable qualities. **The gripping power** of the Geared Scroll Chuck, especially in the larger sizes, **greatly exceeds** that of **any Screw Chuck,** on account of the greater ratio or leverage of the mechanism, as fully explained on page 72. By providing such a Chuck with **independently adjustable and reversible Jaws,** the utmost convenience is attained. The independently adjustable Jaws may be set as required for chucking round, elliptical, or irregular work, either true or in an eccentric position, and **the Geared Scroll Jaw operating mechanism** may be used to grip the work.

Persons familiar with Scroll Combination Chucks will appreciate the great improvement of being able to use the geared scroll mechanism conveniently for tightening, as described. This **avoids entirely the troublesome lever** and the blocking or other means heretofore necessary in preventing the Lathe Spindle from turning when the old style Scroll Combination Chuck is being tightened by the scroll mechanism, and affords a much firmer grip.

When the Jaws have been properly adjusted in the improved Chuck, the jaw screws do not need to be manipulated again until the Chuck is to be adjusted for some other work. The independently adjustable Jaws may also be set to true up the work accurately, regardless of wear in the scroll mechanism, so that a Chuck of this class will give satisfactory service until completely worn out.

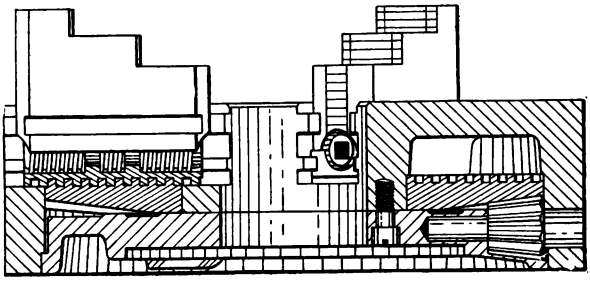


FIG. 49.

It is not necessary to throw any combination device "in" or "out" to make the Chuck universal or independent, as the wrench may be directly applied to the scroll or screw mechanism, as required.

In tightening by the scroll (universal) mechanism it is not necessary to apply the wrench successively in different positions around the Chuck, as any single application will give the full gripping power.

The construction of the geared scroll mechanism is similar to that used in our Reversible Jaw Geared Scroll Chucks (page 41) and **the body of the Chuck is made without any joint,** being very strong underneath the Jaws. The upper jaw sections are independently adjustable by means of screws, mounted according to our patented construction, in such a manner that **the range of adjustment** for each Jaw **is unusually wide,** giving the Chuck great capacity (see the table of dimensions on page 51). **Each Jaw** may be **conveniently reversed** whenever necessary.

The Chuck combines the useful qualities of both our Patent Geared Scroll Chucks and our Patent Independent Jaw Chucks, and **we recommend it as superior to any Combination Chuck ever offered.**

These Chucks are made in the best manner and of the best materials throughout. The jaws are of a special quality

of steel well suited to the requirements, and the scrolls are steel forgings or (in sizes above 24″) direct process steel castings having physical qualities fully equal to forgings. Chucks 18″ in diameter and larger have deep **T** slots in their faces between the jaws so that bolts may be conveniently used when required.

The larger sizes are unusually heavy (see the table of dimensions) and are well adapted for use on heavy lathes and for severe service. They are especially convenient for large work because of the ease with which irregular castings or forgings can be trued up by the screw mechanism and afterward more firmly gripped for the heaviest cuts by the scroll mechanism.

Geared Scroll Combination Chucks are kept in stock fitted with three or four solid reversible Jaws (see Figure 5, page 15), which may be either No. 1 or No. 2 style, according to position when inserted. No. 3 or No. 4 style Jaws (see page 13) may be fitted to order when required, involving a short delay. Chucks having three Jaws will be sent unless four Jaw Chucks are specially ordered.

Price List F.—Geared Scroll Combination Chucks.

Size.	Three Jaws.			Four Jaws.		
	Number.	Code Word.	Price.	Number.	Code Word.	Price.
4″	F 1	Fad	$20.00	F 2	Fail	$26.00
5″	F 3	Fag	22.00	F 4	Farm	28.00
6″	F 5	Fan	24.00	F 6	Fawn	30.00
7½″	F 7	Far	26.00	F 8	Fear	32.00
9″	F 9	Fat	34.00	F 10	Felt	42.00
10½″	F 11	Fed	40.00	F 12	Fend	50.00
12″	F 13	Fin	44.00	F 14	Find	56.00
15″	F 15	Fit	52.00	F 16	Fish	64.00
18″	F 17	Fix	62.00	F 18	Fold	75.00
21″	F 19	Fog	80.00	F 20	Ford	95.00
24″	F 21	Fox	100.00	F 22	Form	120.00
28″	F 23	Fun	150.00	F 24	Flit	180.00
32″	F 25	Fry	200.00	F 26	Flow	250.00

For explanation of code see pages 10 and 11.

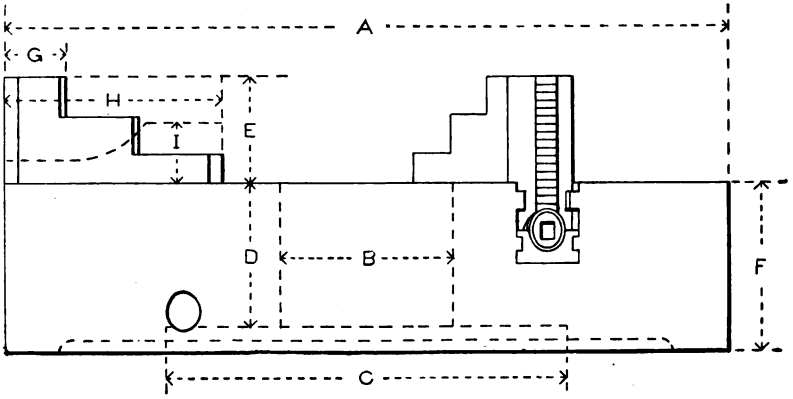


FIG. 50.

Approximate Dimensions (in Inches)

of

Geared Scroll Combination Chucks.

Size.	Will Hold.	Approx. Weight, Pounds. (3 Jaw.)	A	B	C	D	E	F	G	H	I	Size.
4″	5 3/8	9	4 3/8	1	3 23/32	2 3/8	1 3/16	2 1/2	1 5/32	1 9/16	5/8	**4″**
5″	6 1/2	13	5 1/4	1 1/4	4 5/8	2 1/2	1 5/16	2 5/8	1/2	1 13/16	5/8	**5″**
6″	7 5/8	20	6 1/8	1 5/8	5 5/8	2 13/16	1 1/8	2 15/16	5/8	2 1/4	11/16	**6″**
7½″	9 1/4	29	7 5/8	2	7	2 13/16	1 3/8	2 15/16	13/16	2 3/4	13/16	**7½″**
9″	11 1/4	45	9 1/4	2 5/8	8 9/16	3 3/16	1 5/8	3 5/16	1	3 1/4	1	**9″**
10½″	12 1/2	60	10 1/2	3	9 13/16	3 3/16	1 5/8	3 5/16	1	3 1/4	1	**10½″**
12″	14 3/4	85	12	3	7	3	2	3 1/2	1 1/8	4	1 1/8	**12″**
15″	17 1/2	115	14 9/16	3 5/8	8 5/16	3	2 1/4	3 1/2	1 1/4	4 1/2	1 1/2	**15″**
18″	21	190	17 1/2	3 5/8	9 13/16	3 13/16	2 7/16	4 3/16	1 1/2	5	1 1/2	**18″**
21″	24	275	20 5/8	4 3/8	10 1/2	3 13/16	2 7/16	4 3/16	1 1/2	5	1 1/2	**21″**
24″	27	375	23 7/16	4 3/8	13 1/2	3 13/16	2 7/16	4 3/16	1 1/2	5	1 1/2	**24″**
28″	30	550	27 1/4	4 3/8	13 1/2	4 1/4	2 1/2	4 13/16	1 1/2	5	1 3/4	**28″**
32″	35	700	31 3/8	6	13 1/2	4 1/4	2 1/2	4 13/16	1 5/8	6	1 3/4	**32″**

Improved Lever Scroll Chucks.

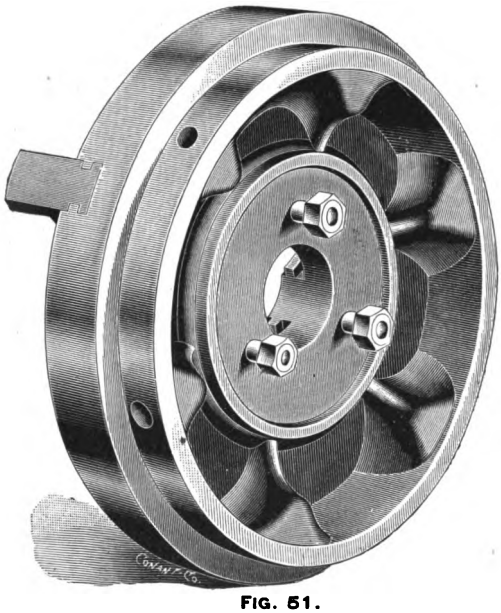


FIG. 51.

OUR special improvement consists in shrinking a band of wrought iron around the front plates of the larger sizes at A (Fig. 52), whereby they are greatly strengthened. The holes in the scroll for receiving the lever are drilled into deep bosses cast for the purpose, while the outer rim between these bosses is left lighter, thus reducing the weight of the Chuck somewhat, and making the parts receiving the heaviest strains stronger than usual in other Lever Chucks. These tools are well made of good materials and are satisfactory Chucks for many requirements, not the least of which is that for a good universal Chuck at a low price. The construction, especially in the larger sizes, allows them to be made very thin, and brings the work near the Lathe Spindle.

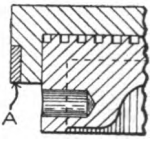


FIG. 52.

They are kept in stock with either 3 or 4 Jaws, fitted with sets of the usual styles (see pages 13 and 14).

Price List H.—Improved Lever Scroll Chucks.

Size.		One Set Jaws.			Two Sets Jaws.		Extra Sets Jaws, ordered without Chuck.
		No. 1 Style. Code Word.	No. 2 Style. Code Word.	Price.	Code Word.	Price.	
3″	3 Jaws	Had	Hag	$8.00	Hall	$10.00	$2.50
	4 Jaws	Hack	Hail	9.00	Hill	11.60	3.00
4″	3 Jaws	Ham	Hat	10.00	Hiss	12.40	3.00
	4 Jaws	Halt	Hand	11.00	Huff	14.20	3.75
6″	3 Jaws	Haw	Hay	15.00	Hull	18.60	4.00
	4 Jaws	Hang	Hank	16.50	Hurr	21.30	5.25
9″	3 Jaws	Hem	Hew	20.00	Huzz	24.80	5.50
	4 Jaws	Hark	Harm	22.00	Haaf	28.40	7.50
12″	3 Jaws	Hex	Hid	26.00	Heed	32.00	7.50
	4 Jaws	Harp	Hasp	29.00	Heel	37.00	9.50
15″	3 Jaws	Hit	Hip	32.00	Heer	40.00	10.00
	4 Jaws	Heap	Heat	36.00	Hood	46.60	12.00
18″	3 Jaws	Hob	Hot	38.00	Hoof	46.00	11.00
	4 Jaws	Help	Herd	42.00	Hook	52.60	13.00
21″	3 Jaws	Hub	Hug	48.00	Hoop	58.00	12.00
	4 Jaws	Hilt	Hunt	53.00	Hoot	65.00	15.00
24″	3 Jaws	Hum	Hut	60.00	Happen	70.00	13.00
	4 Jaws	Hold	Hart	66.00	Harrow	80.00	16.00

For explanation of code see pages 10 and 11.

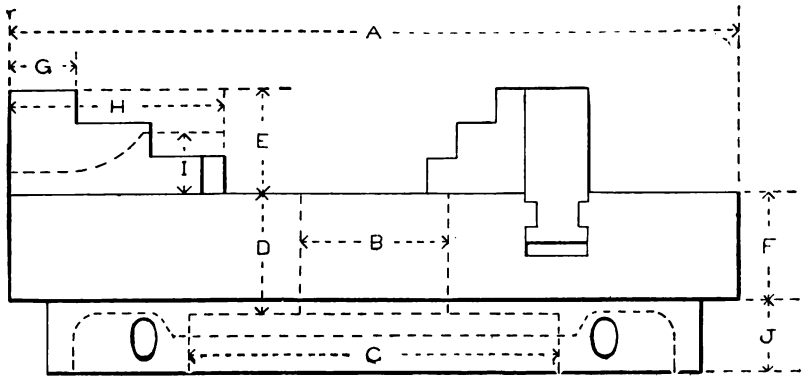


FIG. 53.

Approximate Dimensions (in Inches)

of

Improved Lever Scroll Chucks.

Size.	Will Hold.	Approx. Weight, Pounds. (3 Jaw.)	A	B	C	D	E	F	G	H	I	J	Size.
3″	3⅜	3	3 1/16	11/16	2 11/16	1 11/16	5/8	3/4	3/8	1 3/16	1/2	1	**3″**
4″	4¼	5½	4 1/8	1	3 11/32	1 7/8	13/16	13/16	1/2	1 1/2	5/8	1 1/8	**4″**
6″	6½	10	6	1 1/2	3 25/32	2 1/4	1 1/16	1 1/8	5/8	2 3/16	11/16	1 7/32	**6″**
9″	10½	30	9	1 5/8	4 29/32	2	1 9/16	1 21/32	15/16	3 1/4	1	1 1/8	**9″**
12″	14	58	12 7/16	2 5/16	6 5/16	1 5/8	1 7/8	1 13/16	1 1/8	3 15/16	1 1/8	1 1/4	**12″**
15″	17	98	15 1/2	2 5/8	7	1 7/8	2 3/16	1 15/16	1 1/4	4 7/16	1 1/2	1 1/4	**15″**
18″	20½	130	18 1/8	2 7/8	7 9/16	2 1/8	2 1/8	2 1/8	1 1/4	5	1 1/2	1 5/16	**18″**
21″	23½	189	21	4 1/16	9 13/16	2 5/16	2 1/8	2 1/4	1 1/4	5	1 1/2	1 3/8	**21″**
24″	26½	236	24 1/8	4 1/16	9 13/16	2 5/16	2 1/8	2 5/16	1 1/4	5	1 1/2	1 7/16	**24″**

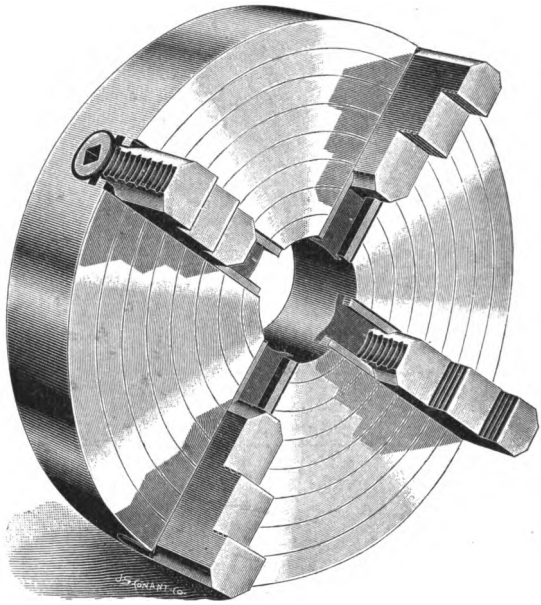


FIG. 54.

New Independent Reversible Jaw Chucks.

IN extended use, our Patent Independent Jaw Chucks have proved to be very durable and convenient tools. A large number have been sold, and they now have an acknowledged reputation for **superiority of design.**

The improved arrangement of the parts is shown in Figs. 55 and 56, and provides some **notable advantages,** to which we invite attention.

The body of the Chuck is a single heavy casting, strongly proportioned, and has radial slots in which the Jaws slide. Beneath these slots are parallel cylindrical recesses, into which the screws are fitted, and inserted in a radial direction. This construction shows clearly in Fig 55. The screws, which are of large diameter, are grooved or necked down near the center, and are held in place in the Chuck by a **steel plate** having a **U** shaped bearing, as shown. This plate is fitted to a groove in the frame of the Chuck and inserted from the back side after the screw is in place. It is **thoroughly hardened** and receives all the thrust of the screw.

The screws have square recesses in their outer ends to re-

ceive the wrench, which is more conveniently applied than when the recess is in the wrench, because **both squares are always in sight.**

As a result of the improved construction, the following important advantages are obtained.

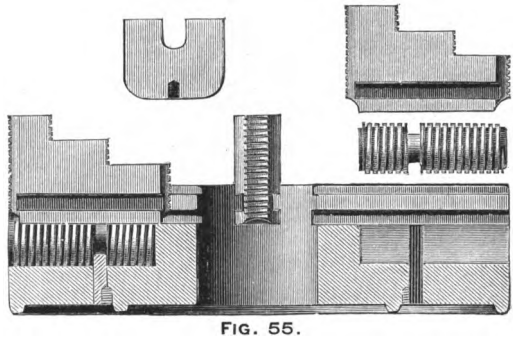


FIG. 55.

1. The screw threads extend fully to the outside of the Chuck, so that **the Jaws have greater traverse** than in other Independent Chucks, and work larger than the diameter of the Chuck may be safely held.

2. The thrust of the screws in gripping the work is received on **hardened steel shoulders,** which are very durable, and consequently the backlash from end wear is very much reduced.

3. The screws may be easily removed if desired, but are held in place in the Chuck, so that they will not fall out or become at all displaced when the Jaw is removed.

4. Should a jaw and screw become stuck together from lack of oil or any other cause, they can be removed from the Chuck and separated without injury.

The workmanship and materials are excellent throughout. **The screws have a finer pitch** than commonly employed in Independent Chucks, giving them **unusual gripping power.** The Jaws are of the solid reversible pattern described on page 15 (Fig. 5), and on account of their long traverse, the safe capacity of the Chuck is much larger than that of other Independent Chucks of equal diameter (see the table of dimensions on page 57). **The ease with which the Jaws can be reversed is a feature of great convenience.**

While the large capacity of these Chucks is frequently of great importance, enabling work to be held for which there might otherwise be no facilities, yet it should be understood that we recommend for constant use a Chuck at least as large as the work to be held.

These Chucks are kept in stock fitted with either three or four of the regular reversible Jaws, as shown. No. 3 or No. 4 Jaws, or special Jaws of any shape, will be fitted to order when desired, involving a short delay.

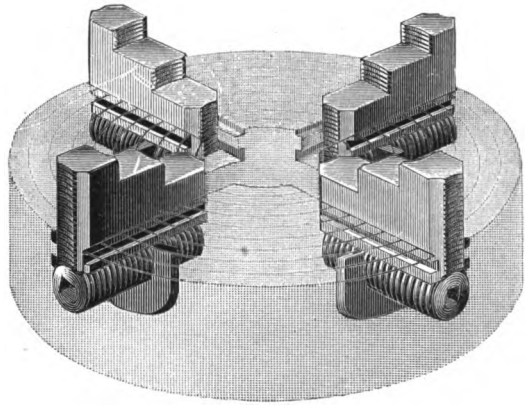


FIG. 56.

Price List V.—New Independent Reversible Jaw Chucks.

(See pages 54 and 55.)

Size.	Three Jaws.			Four Jaws.		
	Number.	Code Word.	Price.	Number.	Code Word.	Price.
6″	V 1	Van	$16.50	V 2	Vail	$18.00
7½″	V 3	Vat	18.00	V 4	Vain	20.00
9″	V 5	Vex	21.00	V 6	Vair	24.00
10″				V 8	Vamp	26.00
12″	V 9	Vim	27.50	V 10	Vang	30.00
14″				V 12	Vark	34.00
15″	V 13	Viz	31.00	V 14	Vant	35.00
16″				V 16	Vast	38.00
18″	V 17	Von	38.00	V 18	Veal	44.00
20″				V 20	Vend	50.00
21″	V 21	Vow	48.00	V 22	Verb	55.00
22″				V 24	Verd	57.00
24″	V 25	Vox	56.00	V 26	Vest	65.00
26″				V 28	View	75.00
28″				V 30	Viol	100.00
30″				V 32	Void	120.00
32″				V 34	Volt	150.00

For explanation of code see pages 10 and 11.

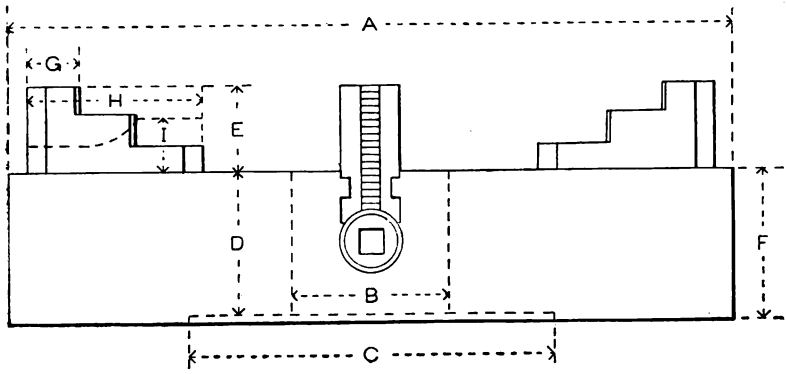


FIG. 57.

Approximate Dimensions (in Inches) of New Independent Jaw Chucks.

(See pages 54 and 55.)

Size.	Will Hold.	Approx. Weight, Pounds. (4 Jaw.)	A	B	C	D	E	F	G	H	I	Size.
6″	7½	14	6	1 5/8	3 25/32	2 17/32	1	2 5/8	3/4	2¼	11/16	**6″**
7½″	9¾	18	7½	2 1/8	4 5/8	2 15/32	1 3/8	2 9/16	7/8	2¾	13/16	**7½″**
9″	11¾	38	9	2 5/16	4 29/32	2 11/16	1 9/16	2 7/8	1	3¼	1	**9″**
10″	12¾	46	10	2 5/16	4 29/32	2 25/32	1 9/16	2 15/16	1	3¼	1	**10″**
12″	14½	60	12	2 15/16	6 5/16	2 23/32	1 7/8	3 1/16	1⅛	4	1⅛	**12″**
14″	16½	80	14	2 15/16	6 5/16	2 15/16	1 7/8	3 1/8	1⅛	4	1⅛	**14″**
15″	18	98	15	3 1/8	7	2 15/16	2 5/16	3 1/4	1¼	4½	1½	**15″**
16″	19	114	16	3 1/8	7	3 1/16	2 5/16	3 1/4	1¼	4½	1½	**16″**
18″	21	130	18	3 7/8	8 5/16	3 1/16	2 5/16	3 5/16	1½	5	1½	**18″**
20″	23	148	20	3 7/8	8 5/16	3 1/8	2 5/16	3 5/16	1½	5	1½	**20″**
21″	24	160	21	3 7/8	8 5/16	3	2 5/16	3 1/4	1½	5	1½	**21″**
22″	25	175	22	3 7/8	8 5/16	3 1/8	2 5/16	3 5/16	1½	5	1½	**22″**
24″	27	194	24	3 7/8	8 5/16	3 1/16	2 5/16	3 5/16	1½	5	1½	**24″**
26″	29	230	26	4 3/8	9 13/16	3 1/16	2 5/16	3 1/2	1½	5	1½	**26″**
28″	31	280	28	4 3/8	9 13/16	3 1/4	2 5/8	3 3/4	1½	5	1¾	**28″**
30″	34	335	30	6	13 1/2	3 1/4	2 13/16	4 1/8	1½	6	2	**30″**
32″	36	400	32	6	13 1/2	3 1/4	2 13/16	4 1/4	1½	6	2	**32″**

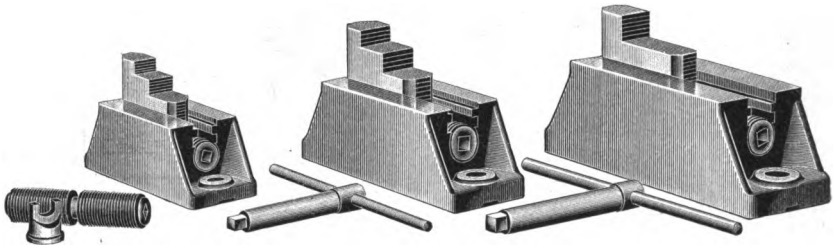


FIG. 58.

Improved Face Plate Jaws.

THE advantages afforded by the patented method of mounting the screws in our Independent Jaw Chucks are of equal importance in Face Plate Jaws. The construction employed is clearly indicated in the cut, the screw being held in place by a hardened steel plug fitted to the casting and shaped to enter the groove near the center of the screw. The wear is thus received on **hardened steel shoulders** and the screw thread is much longer than usual, giving the sliding Jaw greater traverse. The sliding Jaw is of the solid reversible pattern described on page 15 (Fig. 5). The entire Jaw base may also be reversed if desired, as both ends of the screws are fitted to receive the wrench.

These Face Plate Jaws are useful on the tables of Boring Mills, and as substitutes for regular Chucks on large Lathes. They are made in the best manner and are fully guaranteed. We keep three sizes in stock, which are supplied in sets of three or four as ordered.

Special Sliding Jaws may be fitted for holding any work for which the regular Jaws are not adapted, and can usually be furnished promptly.

Price List D.—Improved Face Plate Jaws.

Size.	Sets of Three.			Sets of Four.		
	Number.	Code Word.	Price.	Number.	Code Word.	Price.
8″	D 1	Dig	$45.00	D 2	Damp	$60.00
10″	D 3	Dip	60.00	D 4	Dark	80.00
12″	D 5	Dun	90.00	D 6	Dart	120.00

For explanation of code see pages 10 and 11.

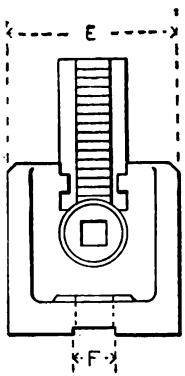


FIG. 59.

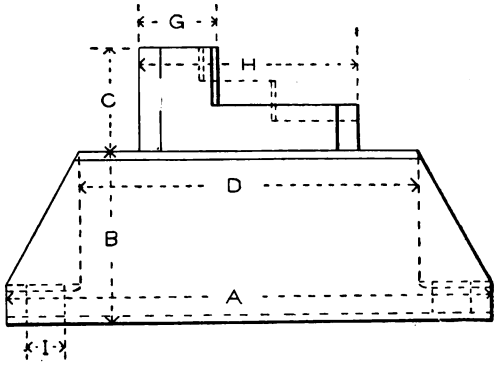


FIG. 60.

Approximate Dimensions (in Inches)

of

Improved Face Plate Jaws.

Size.	Approx. Weight, Pounds. (Each.)	A	B	C	D	E	F	G	H	I	Size.
8″	14	8	3	$1\frac{3}{4}$	$5\frac{3}{8}$	3	$\frac{7}{8}$	$1\frac{1}{8}$	4	$\frac{21}{32}$	**8″**
10″	24	10	$3\frac{9}{16}$	$2\frac{3}{16}$	7	$3\frac{1}{2}$	$\frac{7}{8}$	$1\frac{1}{4}$	$4\frac{1}{2}$	$\frac{23}{32}$	**10″**
12″	40	12	$4\frac{1}{8}$	$1\frac{7}{8}$	$8\frac{9}{16}$	$4\frac{1}{4}$	$\frac{7}{8}$	$1\frac{5}{8}$	5	$\frac{29}{32}$	**12″**

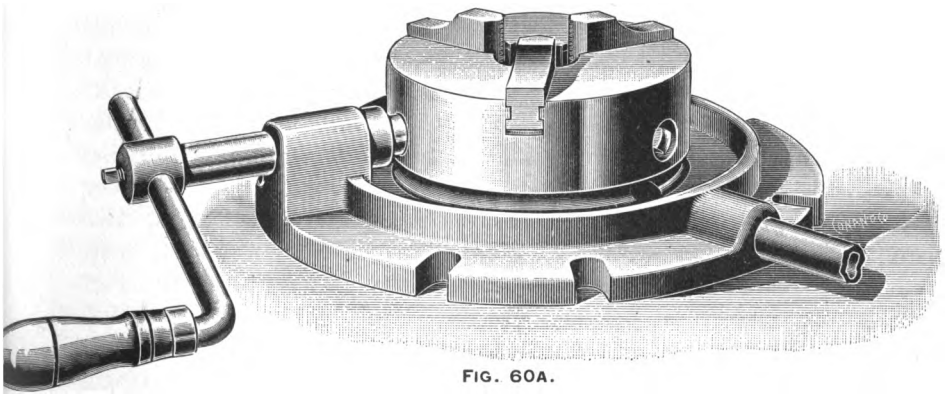


FIG. 60A.

Drill Press Table Chuck.

(For particulars see page 89.)

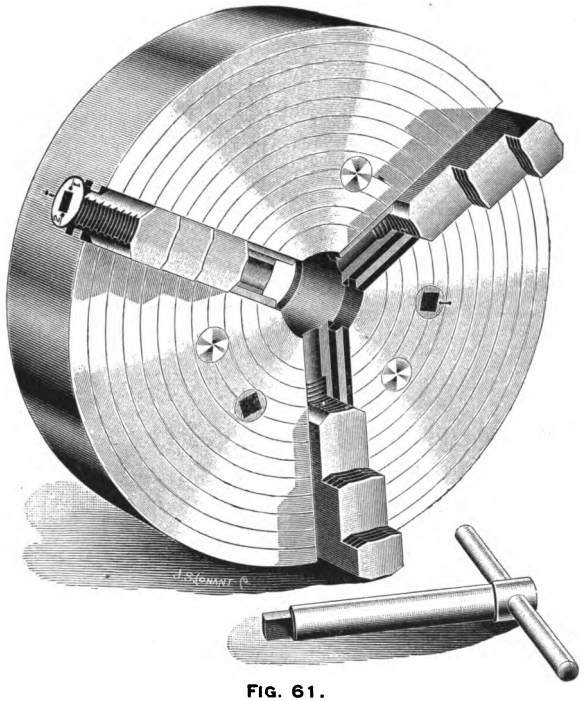


FIG. 61.

Geared Screw Combination Chucks.

THESE new Chucks resemble our standard Independent Jaw Chucks in appearance, and have open radial slots in which are fitted **solid reversible Jaws** of the pattern described on page 15 (Fig. 5). This form of solid Jaw is in itself a great advantage over the separable reversible Jaws commonly used. The screws are large in diameter, and are provided with thrust shoulders near their centers (similar to the construction employed in our Independent Chucks), whereby the screw threads are allowed to extend fully to the outside of the Chuck, giving the Jaws a **greater traverse than usual,** and greatly increasing the capacity of the Chuck (see the table of dimensions page 65). In the larger sizes (12″ and upwards), these shoulders are made double, as shown in Fig. 62, which increases the area of wearing surface, and prolongs the accuracy of the Chuck. The connecting rack is placed near the center of the Chuck, and is of small diameter and very heavy

section. The screw pinions are at the inner ends of the screws near the center of the Chuck, and are entirely inclosed so that no chips or dirt can get into the gearing.

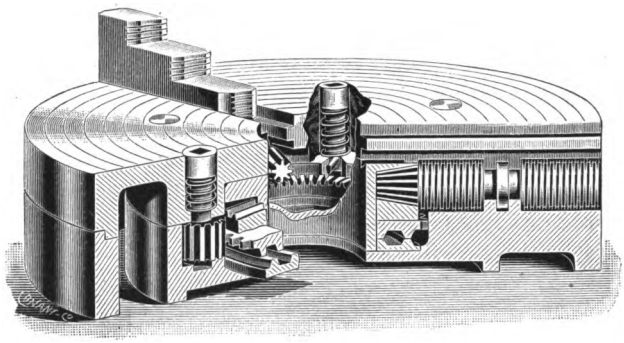


FIG. 62.

The arrangement for connecting or disconnecting the several screws is a very novel and most effective device, whereby the **inclined cam surfaces** which cause the connecting rack to rise and fall **are made very long,** and the action of the parts exceedingly smooth and easy. It consists of fixed and revolving cam rings, each provided with spiral or scroll shaped grooves arranged in opposite directions. In certain positions the tops of these grooves are opposite each other (as shown in Fig. 62) and support the rack in mesh with the several pinions. In other positions they interlock and permit the rack to fall out of engagement. The connecting mechanism is positively locked in either position. The adjustment is made by applying the key to one of the sockets shown in the face of the Chuck (Figs. 61 and 62). The shaft receiving the key is depressed by slight pressure, and is given one full revolution in either direction. This movement serves to connect or disconnect the jaw screws as the case may be. Upon completion of the adjustment, **the mechanism is automatically and positively locked** in the newly adjusted position.

A most important improvement is our patented device for adjusting the position of the connecting rack with regard to the several screw pinions, without the necessity for turning any of the screws. Users of Geared Screw Combination Chucks are familiar with the inconvenience which attends the attempt to set the Jaws of such Chucks true whenever the tops of the

rack and pinion teeth chance to oppose each other. Whenever this condition arises after the several Jaws have been set truly central (as it frequently does), the several screws cannot be connected except by turning one or more of them slightly, or until the rack teeth will mesh properly. But **this necessary movement** of one or more of the screws also **unavoidably disturbs** the previous **accurate setting** of the Jaws, and when the connection is made it is found that the Chuck is not true. **This very troublesome difficulty** is entirely overcome in our improved Chuck by providing a separate adjusting shaft whereby the **connecting rack may be adjusted** whenever this condition occurs, without disturbing any of the jaw screws in the slightest degree.

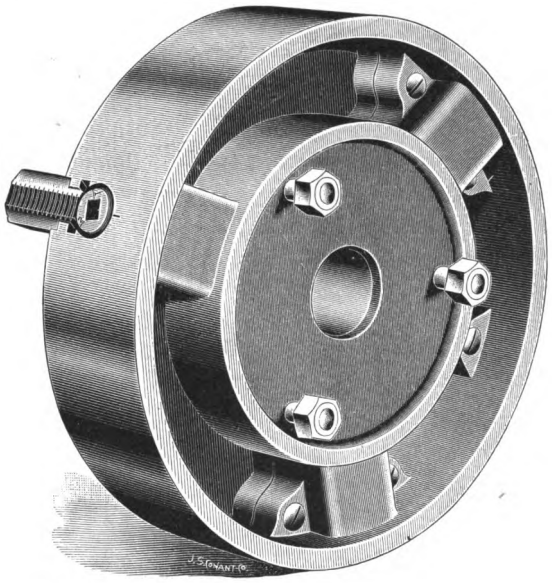


FIG. 63.

The improved Chucks are provided with concentric circles on the face for setting the Jaws approximately true. The outer end of each screw is also provided with index marks numbered "1" and "2," and a single corresponding mark is made on the frame near each screw (shown in Figs. 61 and 63). **Whenever the Chuck is to be set true,** the Jaws are first brought approximately true by setting them to agree with some circle on the face. The several jaw screws are then turned until the

index mark "1" is opposite the mark on the frame if the Jaws are inserted in the "No. 1" position (like Fig. 61; see "Styles of Jaws," page 13), or until the mark "2" is opposite the mark on the frame if the Jaws are inserted in the "No. 2" position. The several screws may then be connected as described by a **single revolution** of the cam adjusting shaft. In case the described difficulty in meshing the connecting gears occurs, it may frequently be overcome by turning the cam adjusting or connecting shaft in the opposite direction, which tends to mesh the gears in a different position; but if this does not overcome the difficulty, the rack adjusting shaft (clearly shown in Fig. 62) is depressed until its projecting arm is in contact with some tooth of the rack, and the shaft is then slightly turned. This movement **adjusts the rack** so that it will readily mesh with the several pinions without disturbing their positions and the Chuck at once becomes a true Universal Chuck, without trouble or inconvenience. The necessary movements can all be made in much less time than they can be definitely described.

The new Chuck should be carefully examined in order to be fully appreciated. **We believe it to be the best and most convenient Chuck of this class ever produced.**

The various illustrations clearly show the improved construction.

The new Chucks are kept in stock fitted with either 3 or 4 solid reversible Jaws of the regular pattern as shown.

No. 3 or No. 4 Jaws and special Jaws for any purpose may be fitted to order, involving a short delay.

Price List P.—Geared Screw Combination Chucks.

Size.	Three Jaws.			Four Jaws.		
	Number.	Code Word.	Price.	Number.	Code Word.	Price.
9″	P 5	Pan	$34.00	P 6	Paid	$42.00
2″	P 7	Par	44.00	P 8	Pail	56.00
15″	P 9	Pat	52.00	P 10	Palm	64.00
18″	P 11	Paw	62.00	P 12	Pang	75.00
21″	P 13	Peg	80.00	P 14	Pant	95.00
24″	P 15	Pen	100.00	P 16	Park	120.00
28″	P 17	Pet	150.00	P 18	Part	175.00
30″	P 19	Pew	170.00	P 20	Peat	200.00
32″	P 21	Pit	200.00	P 22	Pink	240.00
36″	P 23	Pod	230.00	P 24	Pint	285.00
42″	P 25	Pop	270.00	P 26	Pump	325.00

For explanation of code see pages 10 and 11.

Universal Geared Screw Chucks.

THESE Chucks are similar in appearance to the Combination Chucks described on pages 60-63, being the same in every way except that the mechanism for disconnecting the several screws, and the mechanism for adjusting the rack, are omitted.

The Chuck without these mechanisms becomes a plain Universal Chuck, but possesses important advantages, being fitted with the **solid reversible Jaws,** and having in the sizes from 12″ upward, an unusually large area of wearing surface to receive the thrust of the screw. The screw threads extend fully to the outside of the Chuck, as before explained, giving **unusually large capacity.** These Chucks are furnished with 3 or 4 Jaws of the regular pattern, as shown. No. 3 and No. 4 Jaws, and special Jaws for any purpose, may be fitted to order, involving a short delay.

Price List T.—Universal Geared Screw Chucks.

Size.	Three Jaws.			Four Jaws.		
	Number.	Code Word.	Price.	Number.	Code Word.	Price.
9″	T 5	Tag	$34.00	T 6	Tack	$42.00
12″	T 7	Tan	44.00	T 8	Talk	56.00
15″	T 9	Tar	52.00	T 10	Tang	64.00
18″	T 11	Tax	62.00	T 12	Tank	75.00
21″	T 13	Tin	80.00	T 14	Tart	95.00
24″	T 15	Tip	100.00	T 16	Task	120.00
28″	T 17	Ton	150.00	T 18	Taut	175.00
30″	T 19	Top	170.00	T 20	Teak	200.00
32″	T 21	Tow	200.00	T 22	Team	240.00
36″	T 23	Tub	230.00	T 24	Tend	285.00
42″	T 25	Tug	270.00	T 26	Tilt	325.00

For explanation of code see pages 10 and 11.

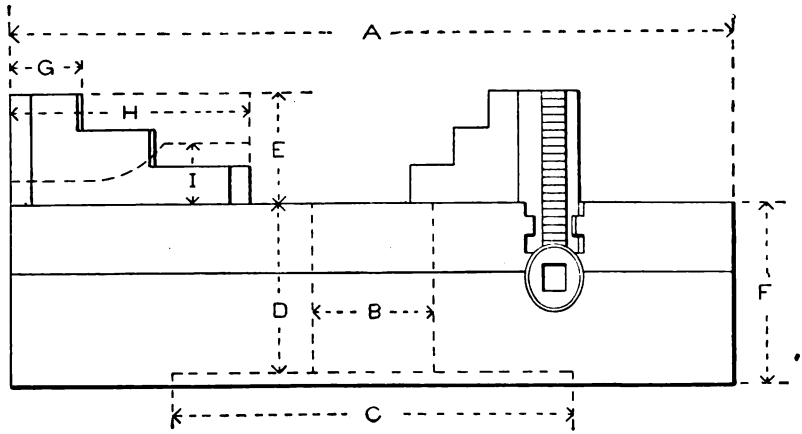


FIG. 64.

Approximate Dimensions (in Inches)

of

Geared Screw Combination and Universal Geared Screw Chucks.

(See pages 60 to 64.)

Size.	Will Hold.	Approx. Weight, Pounds. (3 Jaw.)	A	B	C	D	E	F	G	H	I	Size.
9″	11¾	40	9	1⅝	5⅝	2⅞	1 11/16	3	1	3¼	1	**9″**
12″	14½	75	12	2⅛	6 5/16	3¼	1¾	3 7/16	1⅛	4	1⅛	**12″**
15″	18	120	15	2½	8 5/16	3 9/16	2 3/16	3 13/16	1¼	4½	1½	**15″**
18″	21	150	18	2½	8 5/16	3 9/16	2 3/16	3 13/16	1½	5	1½	**18″**
21″	24	190	21	2½	8 5/16	3 9/16	2 3/16	3 13/16	1½	5	1½	**21″**
24′	27	225	24	3½	10½	4	2 3/16	4½	1½	5	1½	**24″**
28″	31	300	28	3½	10½	4	2½	4½	1½	5	1¾	**28″**
30″	34	350	30	3½	13½	4	2 11/16	4½	1½	6	2	**30″**
32″	36	420	32	3½	13½	4	2 11/16	4½	1½	6	2	**32″**
36″	42	525	36	6	14½	4 5/16	2 15/16	5	1½	7	2½	**36″**
42″	48	650	42	6	14½	4 5/16	2 15/16	5	1½	7	2½	**42″**

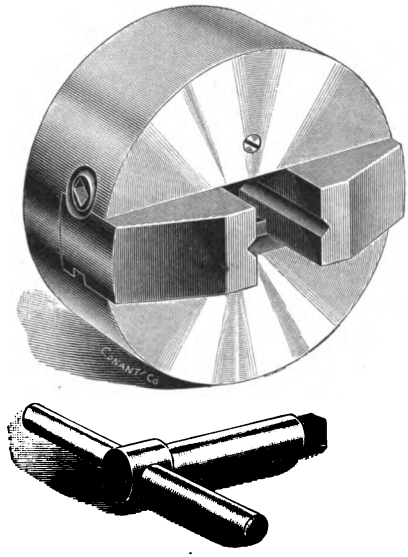


FIG. 65.

Two Jaw Chucks.

OUR improvement in this new line of Chucks consists in providing **hardened steel thrust shoulders** for retaining the screws in place and for receiving the wear, and allowing the screw threads to extend fully to the outside of the Chuck, thereby giving the Jaws greater traverse and increasing the safe capacity of the Chuck, as compared with other Chucks of similar size.

In extended use in our other lines of screw Chucks these improvements have demonstrated their value, and we believe that they will be appreciated in this new line also.

The construction is such that the Chuck may be readily taken apart for cleaning, etc., whenever necessary, but the screw is retained in place within the Chuck Body, so that it will not fall out or become at all displaced when the Jaws are removed.

This new line of Chucks is kept in stock in three styles, as shown in the accompanying cuts.

Style 10 (**Figure 65**) has round body and connected or universal Jaws, provided with a central **V** groove for holding round or square stock, drills, taps, reamers, etc., as shown. The screw is located at one side and a hole passes through the

Chuck, adapting it for use on hollow spindle machines. It is designed for attachment by means of a Face Plate (see the table of dimensions on page 69). It may be fitted with Independent Jaws or with special Jaws of any desired shape (to order only) when required.

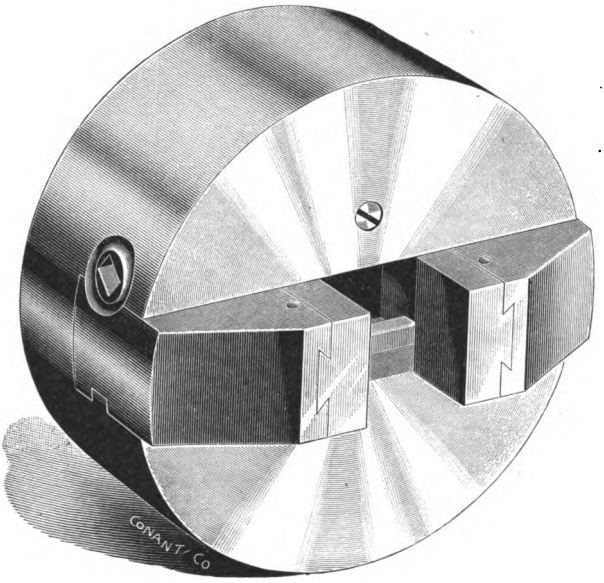


FIG. 66.

Style 20 (**Fig. 66**) also has round body and differs from Style 10 only in the form of Jaws. It is fitted with connected or universal Jaws, provided with the false or slip Jaws shown, which may be of cast iron or steel, as ordered. Unless others are specified, cast iron slip Jaws are supplied (see the table of dimensions on page 69). It may be fitted with Independent Jaws, or with special Jaws of any desired shape (to order only) when required.

Style 30 (**Fig. 67**) has box body with boss to be threaded to fit the spindle, and has connected or universal Jaws, provided with the false or slip Jaws shown, which may be of cast iron or steel, as ordered. The screw is located beneath the Jaws, and there is no hole through the Chuck (see table of dimensions on page 69. It may be fitted with Independent Jaws, or with reversible No. 4 style Jaws, of which both ends may be shaped for holding special work (to order only) when required.

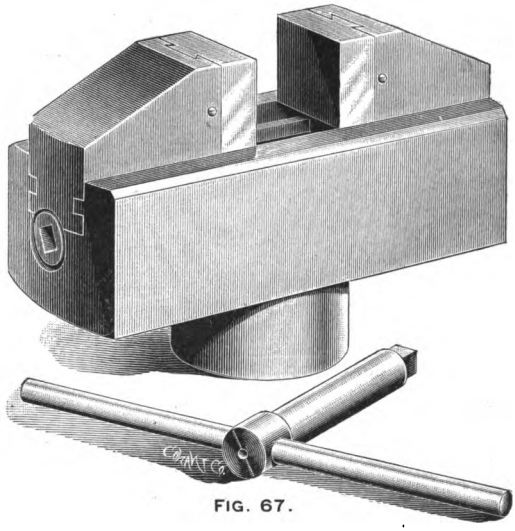


FIG. 67.

Price List R.—Improved Two Jaw Chucks.

Size.		Universal, or Connected Jaws.*						Extra Pairs Slip Jaws.					
		V Groove Jaws. (Style 10.)			Slip Jaws. (Styles 20 and 30.)			Cast Iron.			Tool Steel.		
		No.	Code.	Price.	No.	Code.	Price.	No.	Code.	Price	No.	Code.	Price
Round Body, (Styles 10 and 20.)	4½″	R 1	Rag	12.00	R 2	Raid	16.00	R101	Reed	1.00	R102	Ranch	2.00
	6″	R 3	Ram	18.00	R 4	Rail	20.00	R103	Reef	1.00	R104	Reach	2.00
	7½″	R 5	Red	24.00	R 6	Rain	24.00	R105	Reel	1.00	R106	Realm	2.00
	9″	R 7	Rib	30.00	R 8	Rasp	30.00	R107	Rood	1.25	R108	Right	3.00
Box Body, (Style 30.)	7½″	R 9	Rig†	24.00	R10	Ream	24.00	R109	Roof	1.00	R110	Roach	2.00
	9″	R11	Rob†	30.00	R12	Rear	30.00	R111	Rook	1.25	R112	Roast	3.00
	12″	R13	Rub†	36.00	R14	Reap	36.00	R113	Room	1.25	R114	Rough	4.00
	15″	R15	Run†	42.00	R16	Rest	42.00	R115	Root	1.50	R116	Round	5.00

For explanation of code see pages 10 and 11.

***QUIT,** as a separate word, following any of the above code words will indicate that Two Jaw Chucks with **Independent Jaws** are required. (These are not usually in stock, but can be furnished promptly.)

†**Box Body Chucks** with "**V** Groove" or Style 10 Jaws are not usually in stock, but can be furnished promptly.

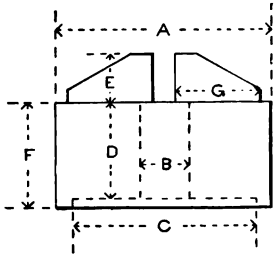


FIG. 68.

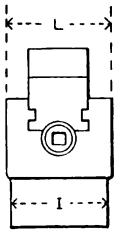


FIG. 69.

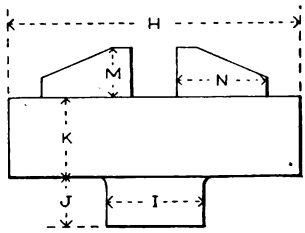


FIG. 70.

Approximate Dimensions (in Inches)

of

Round Body Two Jaw Chucks.

(Styles 10 and 20.)

Size.	Approx. Weight, Pounds.	A	B	C	D	E	F	G	Size.
4½″	15	4½	1	3 25/32	2 21/32	1	2¾	1 11/16	**4½″**
6″	22	6	1¼	5 ⅛	2 21/32	1¼	2¾	2 3/16	**6″**
7½″	30	7½	1½	7	3 13/32	1½	3½	2 15/16	**7½″**
9″	40	9	1½	7	3 13/32	2	3½	2 15/16	**9″**

Approximate Dimensions (in Inches)

of

Box Body Two Jaw Chucks.

(Style 30.)

Size.	Approx. Weight, Pounds.	H	I	J	K	L	M	N	Size.
7½″	28	7¼	3¼	2	2 11/16	3½	1⅝	2 15/16	**7½″**
9″	33	8⅞	3¼	2	2 11/16	3½	1⅝	2 15/16	**9″**
12″	62	12	4	2	3 ¼	4¼	2	4	**12″**
15″	69	15	4	2	3 ¼	4½	2	4	**15″**



FIG. 71.

A....4″ Extra Heavy Geared Scroll Chuck.
B....5″ Extra Heavy Geared Scroll Chuck.
C....6″ Extra Heavy Geared Scroll Chuck.
D....7½″ Extra Heavy Geared Scroll Chuck.
E....18″ Extra Heavy Geared Scroll Chuck.
F....24″ Extra Heavy Geared Scroll Chuck.
G....28″ Extra Heavy Geared Scroll Chuck.
H....32″ Extra Heavy Geared Scroll Chuck.
I....24″ Extra Heavy Independent Jaw Chuck.
J....24″ Extra Heavy Independent Jaw Chuck, fitted with Revolving Jaws.
K....28″ Extra Heavy Geared Scroll Chuck, fitted with Revolving Jaws.

Chucks for Heavy Work.

MODERN requirements in connection with the massive Turret and Special Lathes, which are now such important factors in the economical production of the heavier classes of lathe work, call for Chucks of correspondingly heavy proportions.

The ordinary Lathe Chucks are entirely inadequate for this class of work, on account of insufficient weight and gripping power. Work held in them "chatters," or pulls out, long before the maximum capacity of the Lathe is reached, and the possible production is greatly reduced in consequence.

This is particularly true in those cases where several cutting tools operate at once, or where broad sweeping or finishing cuts are to be taken, so that the success of these improved processes and machines depends very largely upon the use of suitably designed Chucks of sufficient weight and gripping power.

Chucks capable of meeting these conditions have not heretofore been offered, but we are now prepared to supply this demand with tools which have already been used extensively and with uniform success. These new Chucks are perfectly suited to hold heavy castings, forgings, projectiles, etc., etc., with sufficient firmness for any lathe operations.

Figure 71 (made from photograph) shows a group of our Extra Heavy Chucks of various styles, and we invite the attention of those interested in the best practice to the following particulars.

Relative Efficiency of the Scroll and the Screw.

THESE are practically the only mechanisms which can be successfully employed to actuate the widely adjustable Jaws of ordinary Lathe Chucks. Of the two, the relative leverage or mechanical efficiency of the scroll thread is frequently misunderstood. The scroll mechanism gives all the Jaws engaging it, simultaneous or universal movement, and therefore Chucks operated by it only, are not adapted for irregular work; but for that very large class of circular work, composed of gears, pulleys, fly wheels, etc., etc., of which by far the largest number of pieces are usually required, and which may be finished in the modern Lathes by broad sweeping cuts, or upon which several tools may operate at once, the Scroll Chuck is most satisfactory, on account of the **exceedingly powerful grip** which may be obtained.

This holding power in one of our **18″ Heavy Geared Scroll Chucks** is **more than twice as great** as that of the best form of Heavy Independent Screw Chuck, as will be understood from the following:—

The pitch of the scroll thread employed is 2½ per inch: one complete revolution of this scroll plate will, therefore, move all the Jaws engaging with it a radial distance equal to ⅖″; or, since the Jaws oppose each other, the total effective Jaw traverse will be ⅘″. The ratio of the bevel gearing employed to revolve the plate is as 1 to 10⅓, so that 10⅓ revolutions of the wrench are required to traverse the Jaws ⅘″.

The pitch of the screw thread employed in our Heavy Screw Chuck is 6 per inch, which we think to be as fine as can be safely used and prove durable; in the Independent Screw Chuck, therefore, the Jaw travels ⅙″ for each revolution of the wrench and screw; 10⅓ revolutions (as in the previous case) will give the Jaw a travel of $\frac{31}{18}$″.

The relative efficiency may therefore be stated thus: as ⅘″ is to $\frac{31}{18}$″, so is the efficiency of the screw to that of the scroll. Reducing the fractions, the efficiency of the Screw Chuck may be called 72, and that of the Scroll Chuck 155. In other words, the efficiency of the 6 P. thread Independent Screw Chuck is only **46.451%** of that of the 18″ Geared Scroll Chuck.

The efficiency of **any Universal or Combination Screw Chuck,** when operated from one pinion (omitting the increased friction), is only **one half** that of the Independent Chuck, but in the final grip it becomes practically an Independent Chuck by tightening each screw separately in succession, as usually required.

Further **important advantages** in favor of the **Geared Scroll Chuck** should be noted in the following facts:—

1. In proportion as the size of the Geared Scroll Chuck increases for larger and heavier work, its gripping power also increases, whereas in the Screw Chuck this power is constant for all sizes, being no greater in a 24″ or 36″ Chuck than in a 12″.

2. The pitch of the scroll threads can be sufficiently large and coarse so that the working parts have great strength and durability. In a Screw Chuck having anywhere near equal power, the pitch of the screw threads must be so fine as to wear out rapidly.

3. The **loss by friction** in the Geared Scroll Chuck **is much less** than in the Screw Chuck. In finally tightening the Screw Chuck, there is rapidly increasing friction on both the threads and thrust shoulders of each screw in exact proportion to the power applied, because the gripping strains, or forces of reaction, are received entirely by the body of the Chuck. In tightening the Scroll Chuck, there is friction only on the threads, as the forces of reaction, being balanced within the scroll ring, are not transferred to the body of the Chuck, and therefore do not increase the friction on the revolving bearings.

4. In tightening the Geared Scroll Chuck it is **not necessary to apply the wrench successively** in different positions around the Chuck. Any single application gives the full gripping power.

It should be understood that these exceedingly important advantages apply equally to our regular Geared Scroll, Geared Scroll Combination, and Extra Heavy Geared Scroll Chucks, to all of which attention is invited. (See pages 27, 36, 40, 43, 46, 48, and 74.)

Extra Heavy Geared Scroll Chucks.

THESE Chucks are similar in design to our other lines of Geared Scroll Chucks, and include all the advantages of our patented construction described on pages 36 and 40, the **bodies being made of one piece only** and very deep underneath the Jaw. In addition, they are especially proportioned to withstand severe and long continued service and for use on the heaviest Lathes. The parts receiving severe strains have been greatly strengthened. The Jaws are fitted with **two guiding ribs** instead of one, as in the styles heretofore known, which gives a much deeper engagement with the body of the Chuck and provides twice as much wearing surface. This important improvement will be appreciated by those who have experienced the lifting breakage at the slot to which the other styles are liable when too severely strained.

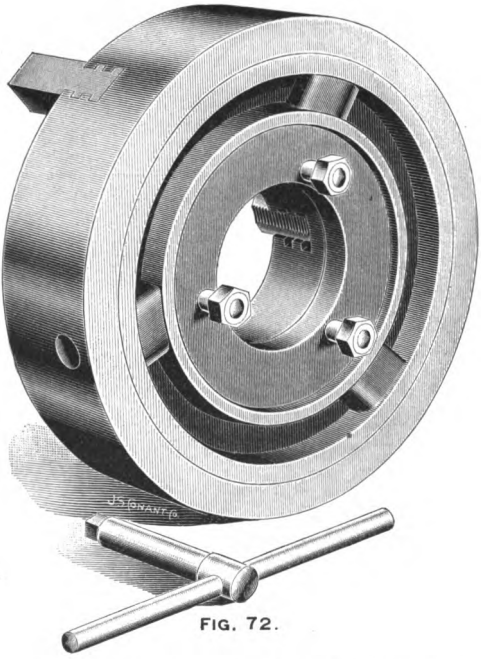


FIG. 72.

Only the best materials are employed. The Jaws are made of a special steel well adapted to the requirements. The scrolls are steel forgings or (in sizes above 24″) direct process steel castings having physical qualities fully equal to forgings. The area of important wearing surfaces, such as the central bearings for the scroll plates, is much larger than in the ordinary Chucks, and all revolving and sliding parts are scraped to a proper bearing.

In view of the demand for heavy and powerful Chucks, adapted to the severe duty required on modern special Lathes, these Chucks are offered in larger sizes than the ordinary Geared Scroll Chucks. Attention is called to their relative efficiency and gripping power, explained on page 72. The Chucks of this new line, up to and including 12″, are kept in stock for immediate delivery. The larger sizes are at present

(January, 1896) made to order only, but a full assortment of the slower finished parts is usually in process, and delivery can be made with reasonable promptness.

The Chucks of this line are supplied fitted with No. 1, No. 2, No. 3, No. 4, and two sets of No. 1 and No. 2 Jaws. We call attention to **the importance of the No. 4 Jaws,** which can be readily shaped for any special piece or easily kept true for holding partially finished work for later chucking operations. When specially ordered, these Chucks can be fitted with Reversible Jaws like Figures 7 or 8, page 16, or with special Jaws for any purpose, which we are prepared to design if required. See the table of dimensions on page 76.

Several sizes are shown in Fig. 71 (page 70), to which please refer. Fig. 79 on page 83, which shows a 32″ Chuck of this line fitted with Rotating Jaws, should also be noticed.

Price List L.—Extra Heavy Geared Scroll Chucks.

Size.	One Set Jaws.			Two Sets Jaws.		Extra Sets Jaws, without Chuck.	
	No. 1 Style. Code Word.	No. 2 Style. Code Word.	Price.	Code Word.	Price.	Styles Nos. 1, 2, 3.	Style No. 4.
4″ 3 Jaws	Lab	Lac	$16.00	Lass	$20.00	$4.00	$3.00
4″ 4 Jaws	Lamp	Land	18.00	Lanch	23.50	5.50	4.00
5″ 3 Jaws	Lad	Laf	20.00	Less	24.00	4.00	3.00
5″ 4 Jaws	Lank	Lard	22.00	Larch	27.50	5.50	4.00
6″ 3 Jaws	Lag	Lar	24.00	Leer	30.00	6.00	4.00
6″ 4 Jaws	Lark	Lash	27.00	Latch	35.00	8.00	5.00
7½″ 3 Jaws	Law	Lax	28.00	Leet	36.00	8.00	6.00
7½″ 4 Jaws	Last	Lath	32.00	Laugh	42.50	10.50	8.00
9″ 3 Jaws	Lay	Led	35.00	Loss	45.00	10.00	8.00
9″ 4 Jaws	Lawn	Leaf	40.00	Learn	53.50	13.50	10.00
12″ 3 Jaws	Leg	Lex	45.00	Loof	60.00	15.00	12.00
12″ 4 Jaws	Leak	Lean	52.50	Light	72.50	20.00	16.00
15″ 3 Jaws	Lid	Lin	65.00	Look	83.00	18.00	15.00
15″ 4 Jaws	Leap	Lent	74.00	Loach	98.00	24.00	20.00
18″ 3 Jaws	Lip	Lix	90.00	Loom	110.00	20.00	17.00
18″ 4 Jaws	Lick	Lift	100.00	Loath	127.00	27.00	22.00
21″ 3 Jaws	Log	Lop	120.00	Loop	142.00	22.00	19.00
21″ 4 Jaws	Link	Lisp	131.00	Lunch	160.00	29.00	25.00
24″ 3 Jaws	Lot	Low	150.00	Loot	175.00	25.00	20.00
24″ 4 Jaws	Load	Loaf	162.50	Lurch	196.00	33.50	27.00
28″ 3 Jaws	Lug	Lud	200.00	Luff	230.00	30.00	24.00
28″ 4 Jaws	Loan	Lock	215.00	Lynch	255.00	40.00	32.00
32″ 3 Jaws	Lux	Luz	275.00	Lull	315.00	40.00	30.00
32″ 4 Jaws	Lord	Luck	295.00	Leech	350.00	55.00	40.00

For explanation of code see pages 10 and 11.

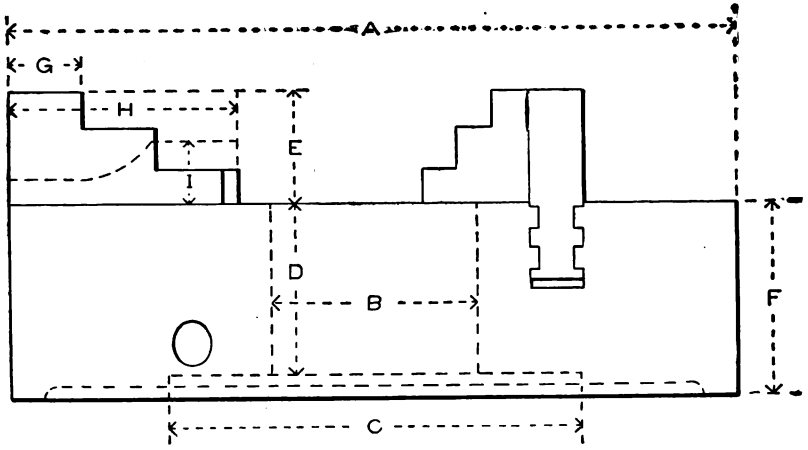


FIG. 73.

Approximate Dimensions (in Inches)

of

Extra Heavy Geared Scroll Chucks.

(See pages 74 and 75.)

Size.	Will Hold.	Approx. Weight, Pounds. (3 Jaw.)	A	B	C	D	E	F	G	H	I	Size.
4″	4¼	8½	4⅜	1	3 25/32	2 5/16	⅞	2 7/16	½	1 ½	⅝	**4″**
5″	5⅜	12	5¼	1¼	4 ⅝	2 5/16	⅞	2 7/16	9/16	1 13/16	⅝	**5″**
6″	6¾	19	6¼	1⅝	5 ⅝	2 17/32	1 1/16	2 21/32	⅝	2 ¼	11/16	**6″**
7½″	8¼	30	7⅝	2	7	2 23/32	1 ⅜	2 27/32	13/16	2 ¾	13/16	**7½″**
9″	10½	60	9¼	2⅝	8 9/16	3 ⅛	1 11/16	3 ¼	15/16	3 ¼	1	**9″**
12″	13½	89	12¼	4	7	2 27/32	1 ⅞	3 9/32	1 ⅛	4	1 ⅛	**12″**
15″	16¼	150	15⅜	3⅝	8 5/16	3 ¾	2 ¼	3 ⅞	1 ¼	4 ½	1 ½	**15″**
18″	20	210	18	3⅝	9 13/16	3 ¾	2 ⅜	3 ⅞	1 ½	5	1 ½	**18″**
21″	23	325	21	4⅜	10 ½	3 13/16	2 ⅜	4 1/16	1 ½	5	1 ½	**21″**
24″	26	475	24	4⅜	13 ½	3 13/16	2 13/16	4 1/16	1 ½	5	1 ½	**24″**
28″	29½	700	28	4⅜	13 ½	4 ⅛	2 13/16	4 ⅜	1 ½	5	1 ½	**28″**
32″	34	925	32	6	13 ½	4 ⅞	3	5 ⅛	1 ⅝	6	1 ⅝	**32″**

Extra Heavy Independent Jaw Chucks.

THE 4 Jaw Independent Chuck has never been excelled for general convenience and adaptation to the wide variety of work for which it affords sufficient gripping power. We now offer a new line of such Chucks embodying the important advantages of our patented construction (see pages 54-55), and made sufficiently strong and heavy to appear well proportioned when mounted upon the most massive Lathes (see reference letters I and J, Fig. 71, page 70; also Fig. 75, page 79). These new Chucks are **designed throughout for severe service.** The construction has been further improved by the use of **double thrust shoulders** upon the screw, which are engaged by correspondingly shaped **hardened steel thrust plugs,** mounted in the frame after the screws are in place (see the sectional drawing on page 80). This design gives a large area of wearing surface, and affords prolonged durability.

The new Chucks have **solid reversible Jaws,** which deeply engage the Chuck body, and are made in the best manner throughout. At present (January, 1896) they are not kept in stock, but are made to order, and can usually be delivered promptly. Special Jaws of any form for special work are furnished to order. If it is desired, we are prepared to design such Jaws for holding any line of work which may be submitted, either by sample or accurate drawing. See the table of dimensions on page 78.

Price List M.—Heavy Pattern Independent Jaw Chucks.

Size.	Three Jaws.			Four Jaws.		
	Number.	Code Word.	Price.	Number.	Code Word.	Price.
14″	M 1	Man	$40.00	M 2	Mail	$50.00
16″	M 3	Map	50.00	M 4	Mark	60.00
18″	M 5	Maw	65.00	M 6	Mask	75.00
20″	M 7	Mew	85.00	M 8	Malt	95.00
22″	M 9	Mix	100.00	M 10	Melt	115.00
24″	M 11	Mop	120.00	M 12	Mend	140.00
28″	M 13	Mow	160.00	M 14	Mesh	180.00
32″	M 15	Mud	225.00	M 16	Mind	250.00

For explanation of code see pages 10 and 11.

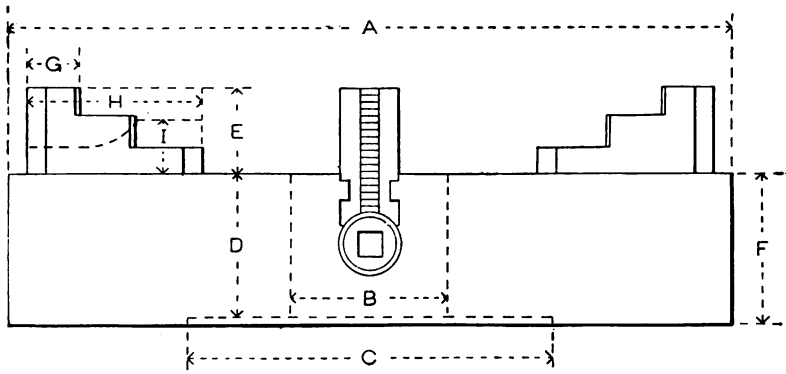


FIG. 74.

Approximate Dimensions (in Inches)

of

Extra Heavy Independent Jaw Chucks.

(See page 77.)

Size.	Will Hold.	Approx. Weight, Pounds. (4 Jaw.)	A	B	C	D	E	F	G	H	I	Size.
14″	16	150	14	2¾	7	4 1/8	2⅜	4	1¼	4½	1½	**14″**
16″	18	190	16	3⅝	8 9/16	4 1/8	2⅜	4	1¼	4½	1½	**16″**
18″	20	250	18	3⅝	9 7/16	4 1/8	2⅜	4⅛	1½	5	1½	**18″**
20″	22	300	20	4⅜	10 ½	4 1/8	2⅜	4⅛	1½	5	1½	**20″**
22″	24	365	22	4⅜	10 ½	4 1/8	2⅜	4¼	1½	5	1½	**22″**
24″	26	435	24	4⅜	13 ½	4 7/16	2⅝	4½	1½	5	1½	**24″**
28″	30	600	28	4⅜	13 ½	5	2⅝	5	1½	5	1½	**28″**
32″	35	775	32	6	13 ½	5 ⅜	2⅝	5	2	6	1⅝	**32″**

Heavy Chucks for Triple Geared Lathes.

WE have supplied a large number of the heavy Geared Scroll and Independent Jaw Chucks described on pages 74 and 77 for use on Triple Geared Lathes, in place of the ordinary heavy face plates commonly furnished. The larger sizes of our Geared Scroll Combination Chucks (pages 48-50) are also very well adapted to this service.

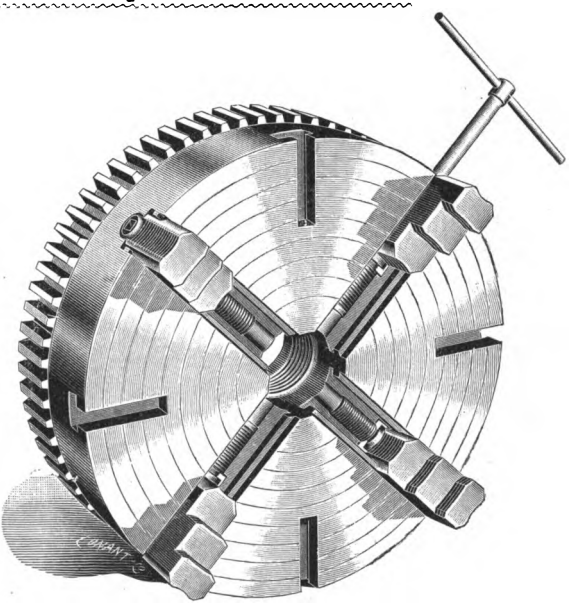


FIG. 75.

For this use, the regular Chuck patterns are modified to provide a seat for the large gear which is usually fastened to or formed as a part of the face plate, but which may be advantageously fastened to one of these improved Chucks instead.

Figure 75 shows a 24″ Heavy Independent Chuck and Figure 79 (page 83) shows a 32″ Geared Scroll Chuck fitted in this manner.

Prices for these Chucks will be quoted upon application.

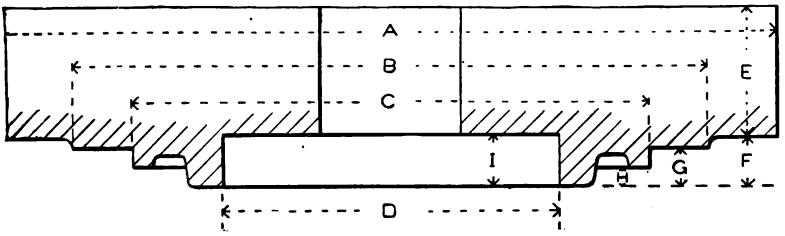


FIG. 76.

The dimensions indicated in Fig. 76 are those of some of our regular patterns for this use, and will be furnished to those who may wish to specify these Chucks when ordering Lathes of this class, upon application. These patterns and dimensions may be varied whenever necessary to accommodate fixed conditions, but, where possible, we recommend the use of a gear ring and face plate which will accommodate our present patterns: otherwise, the extra labor of making the necessary new patterns or changes must be included in the cost, and may involve some delay which might otherwise be avoided.

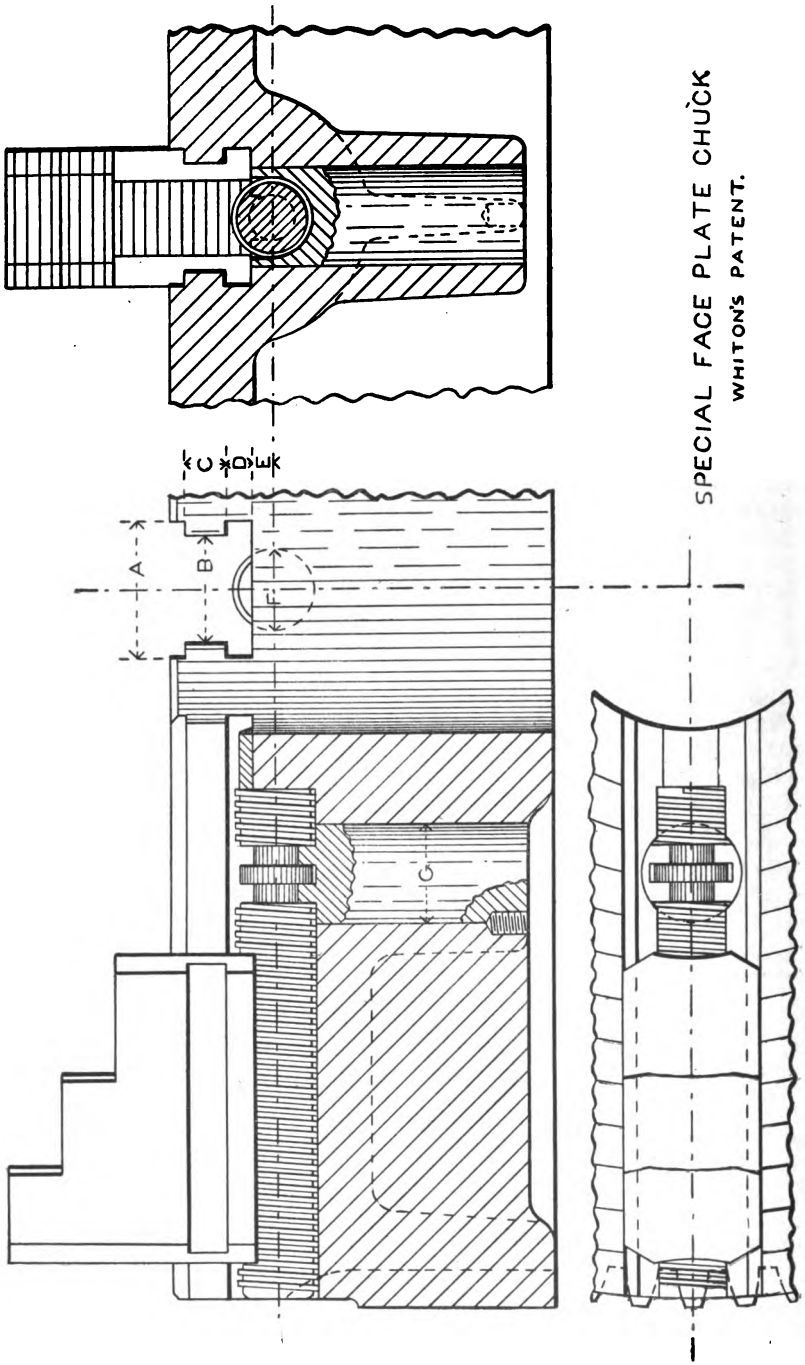


FIG. 77.

Specially Designed Face Plate Chucks.

THE room which may be saved by constructing the large face plate of a heavy Lathe as a Chuck is of much importance. The convenience and correctness of this design, which avoids the use of Face Plate Jaws and the element of weakness which they introduce because of their overhang, is also of the greatest advantage. We are prepared to fit sets of Jaws and screws to such specially designed face plates (to order only), with reasonable promptness. Our patented construction requires only a slight modification of regular patterns, and in many cases we can fit up regular heavy plates in this manner, without the necessity for any pattern changes.

Persons who are to order heavy Lathes are asked to notice particularly our facilities for work of this kind.

The extra expense involved above the first cost of the regular plate is usually less than that of a separate Chuck, and if this improvement is specified in placing orders, the most satisfactory equipment will be secured. The drawings given on page 80 show the construction clearly: the dimensions indicated are those of our present (January, 1896) special tools, and will be furnished to those who may wish to modify existing patterns or to design new patterns for this construction.

Plate patterns may be easily changed to meet the conditions, which are shown clearly in the drawing, views of one Jaw only of the series being given.

Upon application, we will quote prices for fitting the Chuck parts only, or for changing the patterns and supplying completely finished face plate Chucks, if required.

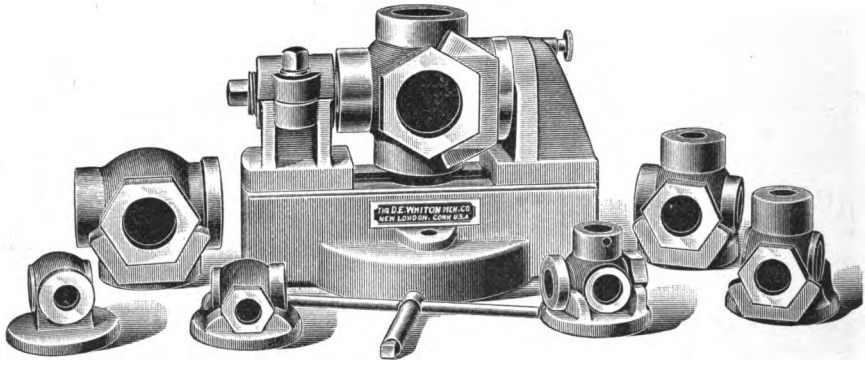


FIG. 78.

Heavy Revolving Jaw or Valve Chucks.

WE have designed a line of greatly improved extra heavy Chucks for holding large valves and similar work requiring a Revolving Jaw Chuck, to which we invite attention. Figure 78 shows one of these Chucks with an outfit of special Jaws, and Figure 79 shows a 32″ extra heavy Geared Scroll Chuck arranged for use on a heavy triple Geared Lathe, and provided with a set of Revolving or Valve Jaws, in addition to the sets of Jaws for regular chucking.

An **important improvement** consists in providing means for holding the **valve casting firmly seated** in the false Jaw, even though it be **slightly irregular.** As shown in Figure 78, only one false Jaw of the shape commonly employed is used, the other Jaw being a cylindrical cup which seats itself on the spherical portion of the valve casting. **This improvement** permits both ends of the valve casting to be seated firmly in the false Jaw, and **prevents looseness** at either end, which is liable to exist when a rigid pair of similar false Jaws are used.

A further improvement consists in providing one of the Jaws with a **threaded spindle,** which may be conveniently adjusted so as to chuck the valve casting perfectly central. These Chucks are not exactly balanced, but being designed for heavy work and for comparatively slow speeds, their other advantages much more than compensate for this departure from common practice.

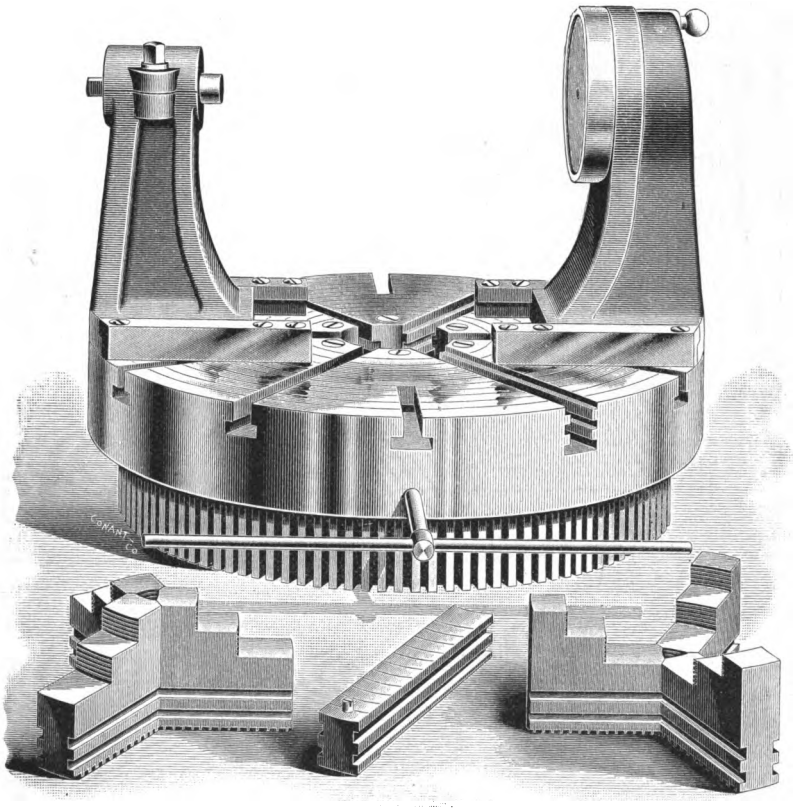


FIG. 79.

On page 84, we give a table of dimensions which indicates the capacity of the different sizes of our regular pattern Revolving Jaws. It is to be understood that these Jaws may be mounted on Heavy Geared Scroll Chucks (page 74), Heavy Independent Chucks (page 77), Special Face Plate Chucks (page 81), or upon Special Chuck Bases like Figure 78, which are designed only for these Jaws. We do not carry these Chucks in stock, but solicit correspondence regarding them. We are prepared to design special Jaws for any class of work which it is feasible to do in this manner, and to furnish complete outfits, with reasonable promptness.

Prices will be quoted upon application.

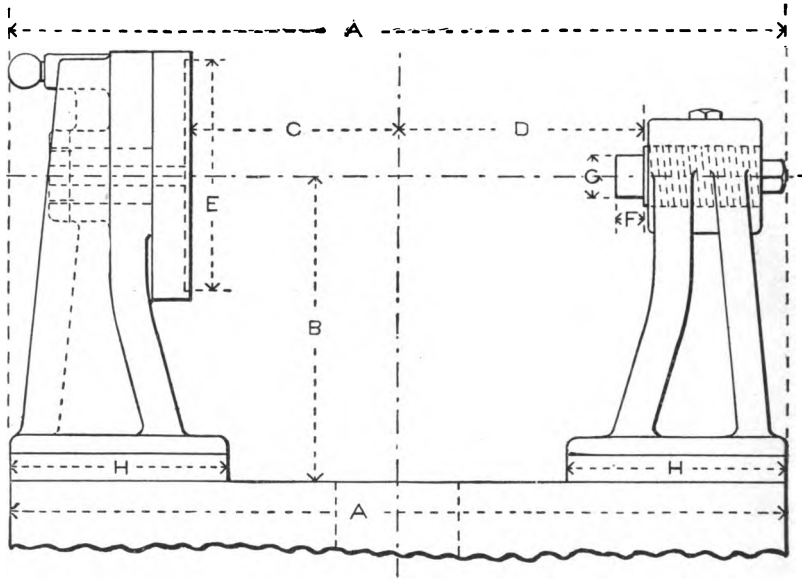


FIG. 80.

Approximate Dimensions (in Inches)

of

Heavy Revolving Jaws.

(See page 88.)

Capacity. Size of Valve.	A Size of Chuck.	B	C	D	E	F	G	H	Capacity. Size of Valve.
3″	18″	$4\frac{3}{8}$	$3\frac{7}{16}$	$4\frac{1}{8}$	$3\frac{25}{32}$	$\frac{3}{4}$	$1\frac{1}{4}$	$5\frac{1}{4}$	**3″**
6″	24″	$7\frac{3}{4}$	$5\frac{1}{2}$	$6\frac{1}{8}$	$6\frac{5}{16}$	1	$1\frac{1}{2}$	$7\frac{9}{16}$	**6″**
8″	28″	$11\frac{1}{16}$	$7\frac{1}{2}$	$8\frac{3}{4}$	$8\frac{5}{16}$	1	$1\frac{1}{2}$	$9\frac{1}{2}$	**8″**
10″	32″	$12\frac{3}{4}$	$8\frac{7}{8}$	$10\frac{1}{8}$	$8\frac{5}{16}$	1	$1\frac{1}{2}$	$10\frac{1}{2}$	**10″**

Chucks for Special Work.

OUR facilities for work of this class are excellent, as we have well equipped Designing, Draughting, and Pattern Making Departments, and have had a large experience in the selection, invention, and use of special chucking tools for a wide range of work which has been submitted to us.

It is manifestly impossible to catalogue the modifications of standard tools which are so frequently required. When feasible, any of the classes and styles of Chucks previously described will be changed as necessary in various details to adapt them for any special conditions or peculiar service, and prices for such work will be made as reasonable as possible. Estimates of cost will be submitted whenever desired, although work of this class must usually be charged for in accordance with the time required. If a large number of special Chucks for any purpose are required, the cost per piece will be proportionately reduced. In the following pages we mention some of the more common modifications, and illustrate some designs which have proved well adapted to their particular uses.

Five Jaw Chucks.

OUR Chucks of any preferred style may be fitted with a larger series of Jaws than usual (to order only), if desired for special work, with reasonable promptness. We mention Five Jaw Chucks as having a special field of usefulness. In such Chucks **no two Jaws directly oppose each other**, and round pieces may be **very accurately centered.** They are also useful in chucking (from the inside) gears, pulleys, etc., having **five arms,** thereby exposing the outer surface of such work to the cutting tools.

Prices will be quoted upon application.

Draw Back Collet Chucks.

WHERE a large number of partially finished pieces of one size are to be held with the utmost possible accuracy by an outer finished surface for later chucking operations, a special Chuck made on the principle of the draw back collet is the most satisfactory device which can be employed. We have quite an assortment of patterns for simple Chucks of this class, which can be mounted on a face plate in the ordinary manner. It should be understood that such Chucks are not recommended as substitutes for regular Chucks, except when a very large number of pieces of the same size are to be held. In such cases, the Collet Chucks will maintain their accuracy for a longer period than the regular Lathe Chuck, on account of the simpler construction and the greater area of wearing surface which can be provided. Of necessity, such Chucks can have only a narrow range of adjustment.

We will quote prices upon such Chucks for any sample piece which can be feasibly held in this manner, upon application, and will give any further particulars which may be desired.

Cutting Off Machine Chucks.

THE main requirement is that a sufficiently large center hole be provided, together with requisite gripping power and durability. We recommend our Extra Heavy Geared Scroll Chucks (see page 74) fitted with No. 3 Jaws, as unexcelled for this purpose.

Upon application, we will quote prices for any special sizes which may be required, in case regular Chucks do not meet all the conditions. It should be noticed that the holes in several lines of our regular Chucks are larger in proportion to the diameter than in other makes.

Centering Machine Chucks.

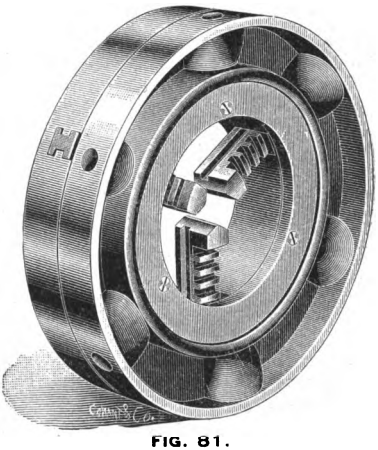


FIG. 81.

IN the manufacture of our "Whiton Centering Machines" (of which catalogue will be sent on application) we use Special Scroll Chucks of the type shown in Figure 81, having **very large center holes** in proportion to their diameter.

These Chucks are very convenient for other purposes. We have supplied many of them for use on special pipe machines. They are also well adapted for use at the rear end of cutting off machine spindles to support the stock, and in many other ways.

Modifications of the regular pattern can be made to suit any particular requirements, upon which prices will be quoted on application.

The regular Chucks are kept in stock as per the following:

Price List E.—Centering Machine Chucks.

Size.	Diameter.	Diameter of Hole.	Thickness.	Three Jaws.		Four Jaws.	
				Code.	Price.	Code.	Price.
No. 1	8″	3¼″	2½″	Ear	$18.00	Earn	$22.00
No. 2	9¾″	4½″	2½″	Eat	21.00	Etch	25.00
No. 3	10⅜″	5½″	2½″	Elf	24.00	Emit	29.00
No. 4*	14½″	7½″	3″	Elk	30.00	Envy	36.00

*No. 4 Chucks are not usually in stock.

For explanation of code see pages 10 and 11.

Grinding Machine Chucks.

ANY preferred regular Chuck may be used, and may be fitted with special Jaws suited to the particular work required. We recommend a Geared Scroll Combination Chuck of proper size as well adapted to this requirement, because of the ease with which the Jaws may be independently adjusted to true up the work.

Prices for special designs of Frames or Jaws quoted upon application.

Milling Machine Chucks.

THESE are regular Chucks of any preferred variety, and may be fitted with Jaws of any suitable shape. In our own use, we have found the Improved Geared Scroll Chuck (page 43), with No. 3 Jaws, very satisfactory, as it occupies but little room, has a powerful grip, and is very durable.

We shall be glad to quote prices upon any special Chucks for this purpose which may be required.

Milling Machine Index Chucks.

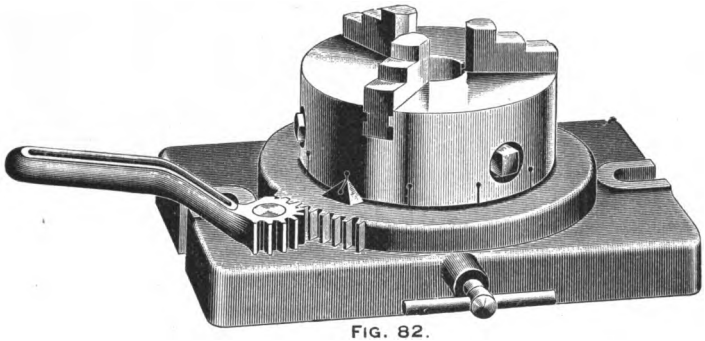


FIG. 82.

FIGURE 82 shows a very useful tool, which is a great convenience in the equipment of the milling machine. The index plate has twelve accurately spaced taper reamed holes, which may be engaged by the lock pin. Bolts, collar screws, special nuts, etc., may be conveniently held in the Chuck while the heads are being finished by straddle or side mills. **The device is very rigid,** and heavy cuts may be rapidly taken upon such work without spring, as the Chuck is conveniently and securely **gibbed at the outer edge** during the cut by means of the segment lever and ring nut shown. When the gib ring is released, the indicator point is brought by means of a stop to a position which indicates when the lock pin may be pushed in.

The Chuck shown is a 6″ "1884 Patent" (page 36), and has center hole 1⅝″ in diameter. When fitted with this Chuck, the distance from the top of the Jaws to the lower surface of the base (or top of machine platen) is 5½″. It may be fitted with a four jaw Chuck or with the extra heavy Geared Scroll Chuck (page 74) if specially ordered, at the difference in price shown by the respective lists.

Price List X.

	Code.	Price.
Fitted with 6″ 1884 Patent Chuck having one set of three Jaws (No. 2 style), ...	Xyloid	$35.00
Fitted with same Chuck having two sets of Jaws,	Xiphoid	38.00

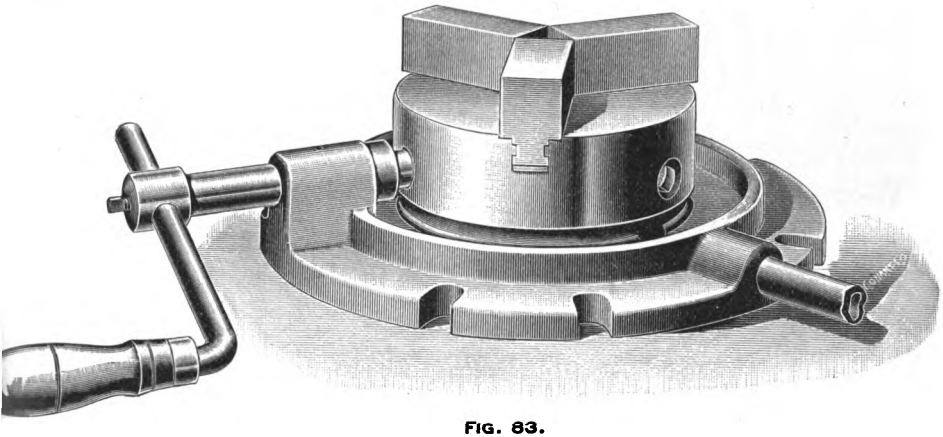


FIG. 83.

Drill Press Table Chucks.

FIGURES 60a (see page 59) and 83 show a method of mounting a Geared Scroll Chuck for use on a drill press table for special work in oil or soda water. The pan retains the oil, and an overflow pipe may be provided, enabling the chips to drain and the oil to be used over and over. The crank handle affords means for rapidly opening and closing the Chuck. We have supplied a number of these Chucks fitted with special blank soft Jaws, like Figure 83, in which dies or other cutters can be mounted. When fitted with dies, such a Chuck makes a very convenient **hand operated Opening Die Head** for threading any class of work which can be conveniently handled in a vertical position.

For such operations, the drill spindle counterbalance may be adjusted to leave some weight on the work, thereby forcing it to the dies without effort. This plan is especially convenient on work which can be driven by a socket carrier fitted to the drill spindle.

Any regular or special Geared Scroll Chuck with three or four jaws can be fitted in this manner. Prices quoted upon application.

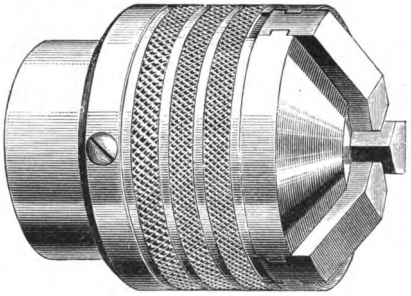


FIG. 84.

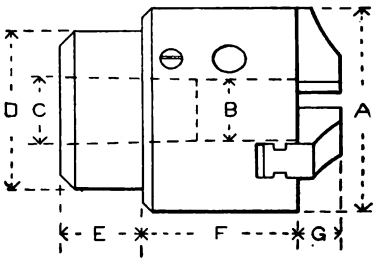


FIG. 85.

1883 Model Drill Chucks.

THE 1883 Drill Chuck is a convenient, well made, and substantial tool for a low price. It is operated by hand and works on the self-tightening principle, the resistance of the cut tending to close the Jaws still more firmly upon the shank of the drill. It is easily attached to Lathe or Drill by means of a taper mandrel, and will hold drills firmly and true. It may be fitted to screw on if desired. Two sizes are kept in stock, with capacity and prices as below:

Price List C 1.

Size.	Number.	Capacity.	Code.	Price.
2″	C 101	0 — $\frac{9}{16}$	Car	$4.00
2½″	C 102	$\frac{1}{64}$ — $\frac{3}{4}$	Cur	5.00

For explanation of code see pages 10 and 11.

Approximate Dimensions (in Inches).

Size	Approx. Weight, Pounds.	A	B	C	D	E	F	G	Size.
2″	1¼	2	$\frac{5}{8}$	$\frac{21}{32}$	$1\frac{9}{16}$	$\frac{13}{16}$	$1\frac{17}{32}$	$\frac{13}{32}$	**2″**
2½″	2½	2½	$\frac{3}{4}$	$\frac{3}{4}$	$1\frac{15}{16}$	$\frac{13}{16}$	$1\frac{17}{32}$	$\frac{13}{32}$	**2½″**

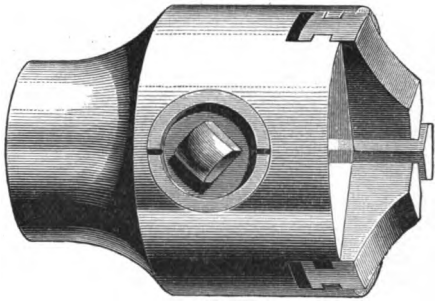


FIG. 86.

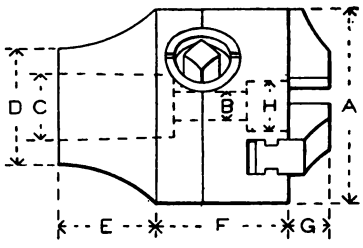


FIG. 87.

Geared Drill Chucks.

OUR Geared Drill Chuck, which is well known for accuracy, firmness of grip and durability, is shown in Figure 86. It is operated by means of a key, and holds drills firmly and true. It is made in the best manner and of the best materials throughout. It is kept in stock arranged for attachment to Drill or Lathe by a taper mandrel, but can be threaded to screw on if desired. Jaws of the form shown in the cut (No. 3 style) will be furnished unless others are specially ordered. Chucks having step Jaws of either style and with both sets (see pages 13 and 14) are kept in stock. These Chucks are also arranged to be fitted by means of a face plate (see page 46).

Price List C2.

Size.	Capacity.	One Set Jaws (No. 3 Style).			Two Sets Jaws.		
		Number.	Code.*	Price.	Number.	Code.	Price.
2″	0 — $\frac{1}{2}$	C 201	Cut	$6.50	C 202	Need	$8.00

*Code for Step Jaws is given on page 46.
For explanation of code see pages 10 and 11.

Approximate Dimensions (in Inches).

Size.	Approx. Weight, Pounds.	A	B	C	D	E	F	G	H	Size.
2″	$1\frac{1}{2}$	2	$\frac{5}{16}$	$\frac{21}{32}$	$1\frac{3}{16}$	1	$1\frac{11}{32}$	$\frac{3}{8}$	$\frac{13}{32}$	**2″**

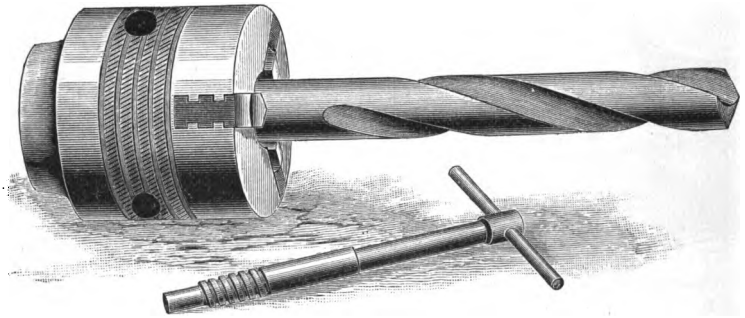


FIG. 88.

Pequot Drill Chucks.

OUR Pequot Drill Chuck, shown in Figures 88 and 89, possesses some important advantages which should be carefully noted. It can be rapidly changed to receive a large or small drill, and has convenient means for tightening suited to all requirements, from the lightest to the heaviest work.

The central part of the Chuck is attached to the drill spindle in the ordinary manner, and the Jaws are opened or closed by turning the outer shell carrying the Jaws upon the central piece. The Chuck is self-tightening, as the resistance of the work tends to close the Jaws more firmly upon the drill. The outer shell is turned freely by hand and the Jaws are thus rapidly changed for large or small drills, as before explained. For small drills sufficient grip may be obtained by simply tightening the Chuck by hand. If more power is required, the application of the screw end of the key in one of the openings closes the Jaws with a **more powerful grip** than that given by any device heretofore employed in Drill Chucks, after which the key may be easily removed, leaving the Chuck without projections. To loosen, the key is applied in the same manner in the other opening, after which the Jaws may be readily set for another size, as before.

In use, the drill is first grasped in the Chuck by moving the Jaws by hand, and may be set to run true without difficulty. The key is then applied, giving the final grip. We guarantee that drills held in this Chuck will not slip under the heaviest feeds.

These Chucks are made in the best manner throughout, great pains being taken to provide sufficient strength to withstand the strains of tightening, and we confidently recommend it to those who want a durable Drill Chuck that will hold firmly. It is especially desirable for heavy drilling or boring, where the utmost gripping power is required, as in holding counterboring or facing tools, etc.

Figure 89 shows part of the Chuck broken away, leaving the center-piece exposed, and showing the key as applied in one of the openings. The center-piece is provided with a

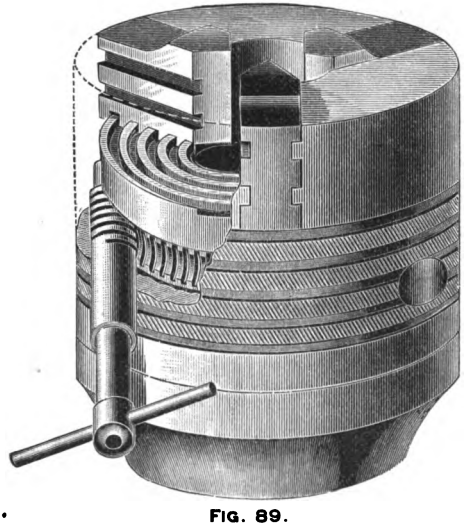


FIG. 89.

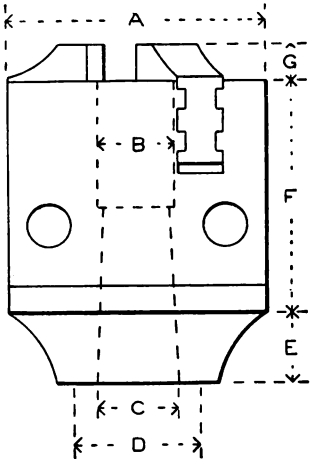


FIG. 90.

series of worm teeth, as shown, with which the screw-key engages. The key is applied in the opening and screwed up until its end comes in contact with the bottom of the hole, which is in the outer case only. It is clear that further screwing up of the key will cause the outer case to turn upon the center-piece, carrying the Jaws with it and forcing them toward the center with great power. By applying the key in the other opening the outer case is turned in the opposite direction, and the Jaws are drawn back.

Price List C 3.

Size.	Number.	Capacity.	Code.	Price.
2″	C 301	0 — $\frac{5}{8}$	Calk	$7.50
2½″	C 302	0 — $\frac{3}{4}$	Camp	9.00
3½″	C 303	0 — 1$\frac{1}{8}$	Card	11.00

For explanation of code see pages 10 and 11.

Approximate Dimensions (in Inches).

Size.	Approx. Weight, Pounds.	A	B	C	D*	E	F	G	Size.
2″	2	2$\frac{3}{16}$	$\frac{21}{32}$	$\frac{21}{32}$	1$\frac{3}{8}$	$\frac{5}{8}$	2	$\frac{1}{4}$	2″
2½″	3	2$\frac{9}{16}$	$\frac{25}{32}$	$\frac{3}{4}$	1$\frac{11}{16}$	$\frac{3}{4}$	2$\frac{3}{16}$	$\frac{1}{4}$	2½″
3½″	7	3 $\frac{1}{2}$	1$\frac{5}{32}$	1 $\frac{1}{4}$	2 $\frac{3}{8}$	$\frac{13}{16}$	2$\frac{13}{16}$	$\frac{1}{4}$	3½″

*"D" is diameter of center-piece and limits the enlargement of "C" for special fitting.

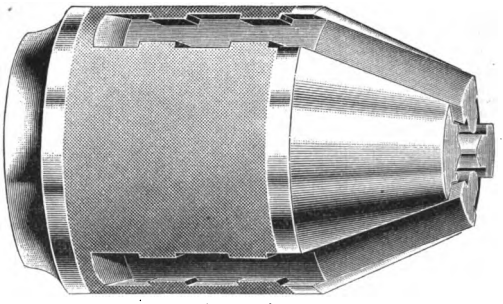


FIG. 91.

1896 Model Drill Chucks.

OUR new 1896 Drill Chuck, now first offered, should be noticed carefully. The central or conically threaded portion (see Figure 92) is attached to the drill spindle by a taper mandrel (or it may be screwed on). To adjust the Chuck, the outer shell is turned by hand, which opens or closes the Jaws as required. The construction is such that the resistance of the work tends to close the Chuck still more firmly upon the drill. The Chuck has a very firm grip and its shape is convenient, enabling the operator to see the work readily.

It is well made of the best materials, and is durable and accurate.

The new Chuck is made in 3 sizes as follows:

Price List C 4.

Size.	Number.	Capacity.	Code.	Price.
1⅝″	C 401	0 — 5/16	Comb	$5.50
2″	C 402	0 — ½	Cord	8.00
2⅞″	C 403	0 — ¾	Cork	10.00

For explanation of code see pages 10 and 11.

Approximate Dimensions (in Inches).

Size.	Approx. Weight, Pounds.	A	B	C	D*	E	F	G	Size.
1⅝″	1	1 19/32	5/16	½	1 9/32	5/16	1 3/8	⅞	**1⅝″**
2″	2	2	½	⅝	1 11/16	5/16	1 7/8	31/32	**2″**
2⅞″	5½	2 27/32	¾	¾	2 11/32	5/16	2 7/16	1 3/8	**2⅞″**

*"D" is diameter of center-piece and limits the enlargement of "C" for special fitting.

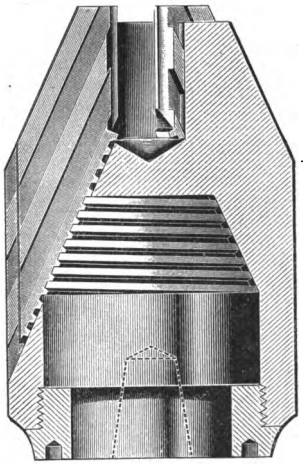


FIG. 92.

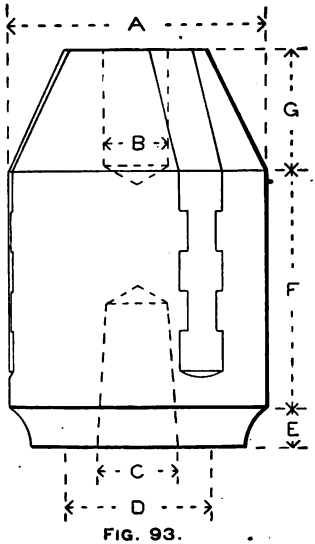


FIG. 93.

Special Drill Chucks.

THE means of attaching any of our standard Drill Chucks to the spindle may be varied in size to suit any special machines if desired, and if such special Chucks can be ordered in quantity, very favorable prices will be quoted upon application.

Users of special Drill Chucks are invited to notice our facilities for producing any such tools which may be required, and correspondence is solicited.

Arbors or Mandrels for Drill Chucks.

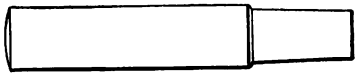


FIG. 94.

Blank Mandrel,
Centered, and one end fitted to Chuck,.....$0.50



FIG. 95.

Mandrel for Blacksmith's Drill,
One end fitted to Chuck; shank $\frac{1}{2}''$, $\frac{5}{8}''$, or $\frac{11}{64}''$ in diameter, $0.50

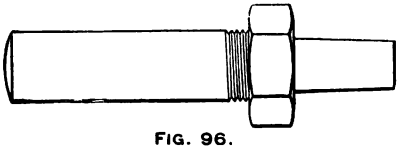


FIG. 96.

Mandrel with Nut,
Centered, and one end fitted to Chuck,..... $1.25

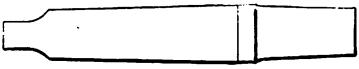


FIG. 97.

Mandrels for Morse Taper.
Nos. 1 and 2, $1.00; No. 3, $1.25
No. 4,..... 1.50; No. 5, 2.00

We also manufacture

Whiton Centering Machines. *Our SINGLE SPINDLE MACHINES were the pioneer tools for this work, and a large number have been sold in all machinery markets. Besides several sizes of these machines, we now make an IMPROVED TWO SPINDLE MACHINE having special advantages over others of similar class, and have many patterns for particular requirements.*

We solicit inquiries and shall be glad to send circulars and prices.

Whiton Gear Cutting Machines. *Our HAND GEAR CUTTER is a very simple and convenient machine, easily adjusted and operated upon all varieties of work. It is especially adapted for use in jobbing and repair shops and is the most complete and satisfactory moderate priced Gear Cutter in the market.*

Send for special circular and large list of references.

Our new FULLY AUTOMATIC GEAR CUTTER (patented in 1895) embodies the very latest improvements. The feed mechanism is entirely disengaged during the spacing movement and is started only by the completion of the spacing, so that the cutter cannot feed forward into an imperfectly spaced blank. All the movements are positively driven from a single driving shaft, and the machine requires only one belt. Upon completion of the gear the spacing is interrupted and a continuous alarm rings until the machine is attended by the operator, thus guarding against loss of time.

Special circular with full particulars will be sent upon application.

Shop Furniture. *We have patterns for a very cleanly and convenient LATHE CHIP TRAY, either with or without oil drainage, which may be handled for emptying, etc., like a wheelbarrow; and for an IMPROVED TABLE TRUCK on casters, having a steering device for controlling the casters so that small work in process of manufacture may be conveniently handled from one machine or part of the shop to another.*

Circulars and prices upon application.

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